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COMBINED TOMOGRAPHY AND BRONCHOGRAPHY (TOMOBRONCHOGRAPHY) IN THE INVESTIGATION OF PULMONARY DISEASE.

By BRYAN GANDEVIA, M.D., M.R.A.C.P.[1]

(From the Hammersmith Chest Clinic and Postgraduate Medical School of London, London, W.12.)

TOMOBRONCHOGRAPHY,[2] or combined tomography and bronchography, is a complex and expensive investigation which involves the exposure of the patient to additional irradiation. Before its frequent use can be justified, it must be shown to provide more information in a reasonable proportion of cases than is obtainable from the two procedures employed independently. No detailed description of the method and its role has appeared in the literature, although it has been used in several thoracic units for the investigation of selected patients, usually with tuberculosis. The present paper records an attempt to define its indications and to assess its value as objectively as possible. It is based upon a personal series of 30 consecutive patients, all of whom were unselected except in so far as bronchography was regarded as a necessary investigation.

[1] Wunderly Travelling Scholar in Diseases of the Chest, The Royal Australasian College of Physicians, 1956-57.

[2] The term "tomobronchography" has been preferred to "bronchotomography" in the present paper; the latter might be regarded as related to the tomographic study of the bronchial tree without the use of contrast media.

Technique and Procedure.

From the point of view of time, tomobronchography was made practicable in routine bronchography sessions by the use of simultaneous multisection tomography (Watson, 1953), whereby five tomographic planes are recorded during a single exposure. For patients who were selected only in the sense that bronchography had been advised as part of their investigation in a clinic devoted to chest diseases, the additional irradiation involved in standard tomography might have been considered unjustifiable, especially as some had previously had a number of chest radiographs and tomographs. Exposure factors, which must be increased for ordinary multisection tomography, were further increased for tomobronchography, but the skin dose of irradiation probably did not exceed half that produced by conventional tomography in five layers. With the apparatus and intensifying screens used in this clinic, the slight "greying" and variation of film quality between planes, sometimes associated with multisection tomography, were negligble.

The bronchographic technique used was a modified form of pernasal endotracheal intubation, the principle of which was first described by Franklin and Orley in 1931. The method is simple, safe and reliable, and, as Vickers (1949) concludes from a thorough review of the available methods, it is most satisfactory for routine use in out-patient prac-

tice. In these circumstances it is desirable to keep preliminary sedation to a minimum, and it is an advantage, in recommending the investigation, to be able to assure the patient that no injections are necessary. The tube[1] used was of the type devised by Helm (personal communication, 1955); it resembles a male urethral catheter, but two lateral holes instead of one, directly above the lead-weighted tip, ensure that it hangs perfectly straight. The weighted end facilitates the progress of the catheter, and makes it easy to adjust the position of the tip by moving the patient's head and shoulders if any check should be encountered. Similarly, it may readily be passed into either main bronchus by appropriate posturing. So that the tube will bend readily arond the back of the nose, several small weights are used rather than a single solid one. "Dionosil Oily", almost always thickened with "Dionosil" powder (two grammes in 20 millilitres) was used in all cases. No appreciable increase in contrast was produced by adding the powder, but it may have been a factor in the rarity with which "alveolar" filling was encountered, even after intervals of half an hour, and sometimes in spite of additional posturing, additional contrast medium and several deep breaths. It may also have been responsible for the absence of the "flocculation effect" occasionally seen in delayed films after "Dionosil" or "Lipiodol". Approximately 18 millilitres of contrast medium, more or less if indicated, were instilled, standard posturing being used; the head of the table was then tilted down. Each position was maintained for one to two minutes. All films were taken with the patient lying down, with a tube-to-film distance of four and a half to five feet for standard views and three feet for tomography. No fluoroscopic control was employed.

At this stage standard bronchographic views were taken. Pending their development, the patient lay flat on the side which had been filled, or alternatively in such a position that drainage away from the area of suspected abnormality was unlikely to occur. This precaution was found to be particularly necessary in the case of apical and small peripheral lesions. After inspection of the bronchographs, appropriate tomobronchographs were taken, sometimes after further posturing and the instillation of further contrast medium. In some cases in which gross bronchiectatic lesions were present, the tomobronchographs were taken immediately after the standard bronchographs; where a bronchial block was suspected, this was avoided, because most of the value of a repeated film is lost if there has been no second deliberate attempt to fill the abnormal bronchus. The tomobronchographs were also delayed when the lesion was small and peripheral, irrespective of its nature, since ideal filling (uniform filling almost to bronchiolar level) cannot always be achieved at the first attempt, and there may thus be doubt as to the reason for non-filling of small subsegmental bronchi in the neighbourhood of the abnormality.

After the tomobronchographs had been taken, the patient was usually allowed to go unless the procedure was to be repeated on the other side.

The Selection of Views and Planes for Tomobronchography.

The selection of the anterior or lateral view for tomobronchography was based upon consideration of the nature and site of the lesion, as judged from clinical data, standard radiographs and tomographs (if available), and from study of the wet bronchographs in most cases. Oblique views are unnecessary on either side, even if the opposite side has been filled first. In very general terms, the major bronchi and upper lobe bronchi are best studied in the antero-posterior view, and lower and right middle lobe bronchi in the lateral view, for anatomical reasons; but this statement is not always true, especially in the presence of considerable distortion. The principle involved is that frequently employed in detailed tomography of the bronchial tree—namely, the demonstration of as much as possible of the affected bronchus in a single tomographic plane. When the lesion is peripheral and predominantly parenchymal, the bronchographs are helpful in determining the approximate plane of the related subsegmental bronchi, and hence the appropriate view. In a few cases of the present series both views were taken.

The selection of appropriate planes was sometimes more difficult, at least in the circumstances of this study. For reasons of economy in radiation exposure, time and materials, only a single exposure (five planes, one centimetre apart) was used as a routine. Additional planes facilitate the identification of peripheral subsegmental bronchi and the correlation of the tomobronchographic appearances with the bronchographs. Early in the series, the mistake was made of selecting planes passing through a primarily parenchymal lesion. While these are sometimes important, the main purpose of the investigation is not fulfilled unless the bronchi leading to the lesion, and thus lying internal to it, are adequately demonstrated. It is obvious that tomobronchographic planes taken peripheral to a parenchymal lesion are wasted. Previous conventional tomographs are valuable in reaching a decision, although the crucial planes are not necessarily the same in both cases.

Various methods have been adopted by different workers to demonstrate particular parts of the bronchial tree by tomography, but these have usually proved too inaccurate to have practical value in routine work. The opportunity for preliminary study of the bronchographs might be expected to increase the accuracy of these methods when applied to tomobronchography. This was tested by trial of the simple postural modification suggested by Jeanneret and others (1949).

With the patient lying on his back, the lower part of his chest being raised a few inches from the table so that the coronal plane of the chest forms an angle of about 10° to 15° with the horizontal, the trachea and most of the bronchial divisions to all lobes on both sides are brought approximately into the same horizontal plane. The precise bronchi displayed on tomography in this position vary from patient to patient, and with the accuracy of posturing. Additional tomobronchographs were taken in this position in several cases, with the object of displaying the posterior basal bronchus in particular, the appropriate angle being gauged from lateral radiographs. While the technique was found to be feasible, and to show major bronchial divisions well, it could not be applied with perfect accuracy on a single attempt in each case. In no instance did it provide more information than the conventional bronchographs. In view of these findings, other postures to demonstrate individual bronchi, with even smaller margins of error, were not used, and experience gained with this view is mentioned here for this reason only.

Results.

Although the responsibility for the views expressed below is mine, reasonable objectivity has been ensured by showing the films to a number of independent observers, and in particular by presenting them at conferences of the clinic staff and at the regular meetings of radiologists and chest physicians of the hospital. The impression has been gained that observer variation in their interpretation is higher than in the interpretation of the bronchographs alone (Gandevia and Stradling, 1957*a*), and is perhaps as high as in the tomographic diagnosis of cavitation, and for similar reasons (Gandevia and Stradling, 1957*b*); it is likely that a different observer would give a slightly different classification of the results from that given below. A comparison of notes made at the time with notes made some months later during a final review suggests that increased experience has led to a more confident and accurate interpretation of the tomobronchographs. This implies that inter-observer disagreement may be expected ultimately to show some decrease when and if tomobronchography is more frequently employed. It may be mentioned that tomobronchographs cannot be read effectively with the same speed as tomographs, nor is it possible to interpret them readily without the conventional bronchographs.

In all cases, tomobronchographs have the same additional value as duplicate radiographs, which are particularly useful when reposturing after the injection of further

[1] These tubes are manufactured by J. G. Franklin & Sons, Portman Square, London. No. 6 English gauge is a satisfactory size.

contrast medium has been carried out. This value, although important, has been discounted for present purposes, and is ignored in the assessments which follow.

Of the 30 cases, no additional information was gained from tomobronchography in 20. In one the wrong planes were taken owing to a misunderstanding. Five of the 20 patients showed no abnormality, or only doubtful evidence of abnormality, on plain radiographs, and the bronchographic appearances were normal. In six patients whose radiographs showed apical or peripheral shadows of various types, the bronchographs revealed no significant abnormality or minor changes in subsegmental bronchi, which the tomobronchographs merely confirmed. Of the remaining eight patients, five had gross localized bronchiectasis, one had a large carcinoma involving the lingular and left upper lobe segmental bronchi, one showed evidence of chronic bronchitis only, and in one an intrinsically normal bronchial tree was associated with normal lung fields and an enlarged gland at the lower pole of the right hilum. Increasing experience of tomobronchography indicated that filling to almost bronchiolar level was indispensable if the most information was to be gained from the technique. In three of the patients with apical or peripheral shadows this was not achieved, either because positioning was not continued for long enough or because contrast medium drained away from the lesion in the period between the taking of the standard films and the taking of the tomobronchographs.

In 10 of the 30 cases, tomobronchography gave helpful additional information, and in six of these this information was particularly valuable. In the first case of the latter group, a small bronchiectatic anterior basal bronchus was obvious on the tomobronchographs, although it was missed or misinterpreted on the usual films by more than one observer. Precise segmental localization was possible with certainty only on the tomobronchographs (illustrated by Gandevia and Keeble, 1957). The bronchographs of the second patient (Figure I) showed a very small bronchiectatic lesion in a peripheral bronchus of the right apical segment; the subsegmental bronchus giving off the bronchiectatic branch was shown in one tomographic plane to be dividing into two branches with pathologically deformed terminations adjacent to tiny foci of disease; the bronchiectatic area was seen in this and the succeeding tomographic plane. Although the chief lesion could be seen on the antero-posterior bronchograph, it lay over the superimposed scapular and vertebral shadows in the lateral view, and was obscured by other bronchi in the oblique view. The subsidiary lesions and their relationship to the small abnormal bronchi were apparent only on the tomobronchographs. A similar situation was encountered in an almost identical lesion, and again the tomobronchographs gave confidence to the interpretation in terms of pathology and of anatomical localization. The fourth patient, with glandular enlargement at the right hilum, was found to have an organic obstruction, subsequently shown to be carcinomatous, to the anterior basal bronchus. The bronchoscopic findings had been normal, and no abnormal shadowing was visible in this area in other films. Despite the relatively large bronchus involved, the anatomy of the lesion was much clearer on tomobronchography than on the standard films. The tomobronchographs also provided a good view of the mode of termination of the affected bronchus, which is, of course, of diagnostic importance. Another patient had a mass of uncertain ætiology in the apical segment of the lower lobe of the right lung; in this instance tomobronchography facilitated anatomical localization in a zone in which the bronchi were crowded, and showed a distorted bronchus terminating irregularly within the lesion. The tomobronchographs, in particular, favoured a diagnosis of tuberculosis rather than carcinoma, and this was subsequently confirmed. The sixth patient had had active tuberculosis of minimal extent at the apex of the right lung three years previously, when inconclusive tomographic evidence of cavitation was found. After chemotherapy only a small thin-walled air space remained at the extreme apex, apparent on tomography. Conventional bronchographic views were valueless, as they showed neither the air space nor its bronchial relations; but the tomobronchographs (Figure II) showed a large branch of the apical segmental bronchus terminating blindly immediately beside the air space and in the same plane.

It is less easy to be dogmatic on the value of tomobronchography in the four remaining cases. It was of help in clarifying the anatomy in a case in which the disorganized upper lobe of the left lung was the site of fibrotic and cystic changes. In another case a bronchus, thought to be possibly abnormal on bronchographs in which it was not easily seen, was found to be in fact normal, and in apposition with a dense, rounded shadow at the hilum. This set of circumstances gave added confidence to the diagnosis of a tuberculous rather than a secondary neoplastic gland[1]. In one case tomobronchographs strongly suggested the presence of an incomplete stenosis proximal to a bronchiectatic segmental bronchus (illustrated by Gandevia and Keeble, 1957), while in the remaining case individual "peripheral pools" (Reid, 1955) were demonstrated in an area where these were so numerous and large as to make adequate interpretation difficult.

Conclusions.

Tomobronchography is merely an extension of bronchography, and as such it has similar limitations in regard to the ætiological and pathological information which it can provide. Basically, it can have no more than two advantages over conventional bronchography: a greater ability to demonstrate parenchymal lesions at the same time as the bronchial tree, and an ability to demonstrate the bronchial tree in layers. With these considerations in mind, it is possible, from the literature and experience to date, to indicate the circumstances in which it may prove helpful.

Where shadows in the lung parenchyma are such that they cannot be clearly identified in plain radiographs, tomobronchography provides a picture which can otherwise only be inferred from an independent study of conventional tomographs and bronchographs. In some instances it is unlikely that the correct inference could be made with either certainty or accuracy, and this is exemplified by the cases illustrated in Figures II and III. The former shows the value of the procedure in demonstrating unequivocally an abnormal bronchus which is obstructed immediately adjacent to the ring shadow of an air space. A similar point is illustrated in a paper by Zsebök (1956), but in his case the broncho-cavitary junction was patent. Three instances of its help in showing diseased bronchi in association with "solid" lesions were encountered in the present series.

Little experience of the investigation is required before it becomes clear that the demonstration of the bronchial tree layer by layer is of considerable assistance in clarifying anatomical relationships. This property of tomobronchography becomes of increasing importance the more peripherally the bronchi are studied. It is necessary to distinguish an abnormal bronchial termination from the passage of a bronchus out of one bronchographic plane, but this is rarely difficult, particularly with the help of the standard bronchographs. Tomobronchographs are valuable when the lesion is peripheral and in the region of an interlobar or intersegmental boundary (Chadourne and others, 1954), or where there is only a small isolated abnormality in a peripheral bronchus. In the presence of crowded, irregular and distorted segmental or subsegmental bronchi, tomobronchography may be invaluable in dissociating one bronchus from another. It is notably in these circumstances that Keers and Adams (1957) have found it helpful in the pre-operative assessment of tuberculous patients when resection is contemplated. In several cases at Pinewood Sanatorium, Berkshire, in which extrafascial apicolysis and plombage had been performed (the films from which I have been permitted to study), bronchography and tomobronchography were subsequently carried out. In the case illustrated (Figure III), a homogeneous, more or less crescentic shadow was seen on plain radiographs; on tomography the appearance was identical, and provided no further clue as to the nature of the lesion. Satisfactory filling in the bronchograph showed distorted bronchi with some "spilling" of the contrast medium,

[1] The lesion was ultimately found to be an aneurysm of the pulmonary artery.

giving a picture which could not be interpreted satisfactorily. One tomobronchographic plane clarified the situation both anatomically and pathologically; the abnormal bronchus can be seen running into the lesion, which has been irregularly filled with opaque material. In other cases of this series the advantage of tomobronchography lay simply in the better definition of bronchial anatomy obtained, an advantage to be expected in relation to any form of collapse therapy.

From the technical point of view, tomobronchography permits the study of bronchial outline where this is obscured in standard films by "alveolar" filling, or where lateral films are required in the presence of contrast medium on the opposite side (Simon, 1956).

With two exceptions, the role of tomobronchography in the study of bronchial outline itself was largely confirmatory in the present series, but Zsebök (1956) has found it useful in the presence of doubtful narrowing or irregularity. The mode of termination of an obstructed bronchus is frequently demonstrated well. In this regard, Keers (1957), who has had extensive experience of tomobronchography during two years of its routine use at Tor-na-Dee Sanatorium, Aberdeenshire, has emphasized the detailed pathological interpretation which may be given to minimal irregularities in very small bronchi in certain circumstances. These may be missed on standard bronchographs, or fine distinctions may not be feasible in a well-filled example. If some of these minute abnormalities of the bronchial tree prove to be reversible, tomobronchography, within certain technical limitations, may be the most convincing way of demonstrating the changes.

The capacity of tomobronchography to delineate small bronchi accurately, and in immediate relation to localized parenchymal shadows, may provide significant help in studying the "solid" peripheral lesions in the lung which frequently cause diagnostic difficulty. Its use in these circumstances requires time and patience, since it is almost essential to any dogmatic interpretation to have obtained uniform bronchiolar filling throughout the lung fields, or at least as much peripheral filling as the state of the bronchial tree allows.

The present study suggests that when tomobronchography is employed as a routine adjunct to bronchography, information additional to that given by conventional bronchographs is obtained in about a third of cases of a variety of conditions. Its use in this way has been abandoned, because it was considered that from the small series of 30 consecutive cases sufficient experience had been obtained to indicate the circumstances in which the procedure was likely to prove helpful. With appropriate selection, based on the foregoing considerations, tomobronchography should be informative in a higher proportion of cases. Determination of its final role must await its evaluation under these conditions.

Summary.

1. The procedure adopted in this clinic for tomobronchography, using simultaneous multisection tomography, is described, and the results obtained in an unselected personal series of 30 cases are reviewed.

2. In certain cases, tomobronchography is a valuable adjunct to conventional bronchography, because of its ability to reveal simultaneously a parenchymal lesion and its related bronchus, and its ability to clarify anatomical relationships, particularly where the normal anatomy is seriously disturbed; it also gives confidence to the interpretation of minute abnormalities of small bronchial subdivisions.

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References.

CHADOURNE, P., DUCHET-SUCHAUX, L., IOANNOU, J., and PINELLI, A. (1954), *"Broncho-tomographie lipiodolée", Rev. tuberc.*, 18: 778.

JEANNERET, R., KOVATS, F., and NICOD, F. (1949), *"Un procédé dans l'exploration tomographique des bronches", J. franç. méd. chir. thorac.*, 3: 116.

FRANKLIN, P., and ORLEY, A. (1931), "A Simple Technique for Introducing Lipiodol into the Lungs", *Brit. M. J.*, 2: 847.

GANDEVIA, B., and KEEBLE, ANN (1957), "Combined Tomography and Bronchography (Tomobronchography)", *Radiography*, 23: 181.

GANDEVIA, B., and STRADLING, P. (1957*a*), "Observer Variation in Bronchographic Diagnosis", in the press.

GANDEVIA, B., and STRADLING, P. (1957*b*), "Observer Variation in the Tomographic Diagnosis of Tuberculous Cavitation", *Tubercle*, 38: 113.

KEERS, R. Y. (1957), personal communication.

KEERS, R. Y., and ADAMS, A. R. (1957), "Bronchographic Tomography in Pulmonary Tuberculosis", *Brit. J. Tuberc.*, in the press.

REID, L. M. (1955), "Correlation of Certain Bronchographic Abnormalities Seen in Chronic Bronchitis with the Pathological Changes", *Thorax*, 10: 199.

SIMON, G. (1956), "Principles of Chest X-Ray Diagnosis", Butterworth, London.

VICKERS, A. A. (1949), "Bronchography — the Methods by Which it May Be Performed", *Brit. J. Radiol.*, 22: 224.

WATSON, W. (1953), "Simultaneous Multisection Tomography", in "Modern Trends in Diagnostic Radiology", edited by McLaren, J. W., Butterworth, London.

ZSEBÖK, Z. (1956), *"Bronchographie im Schichtbild", Ztschr. Tuberk.*, 108: 173.

Legends to Illustrations.

FIGURE IA.—Antero-posterior bronchograph, showing bronchiectasis of a branch of the posterior segmental bronchus. The patient's sputum was repeatedly found to contain acid-fast bacilli.

FIGURE IB.—Antero-posterior tomobronchograph. The small bronchiectatic zone lay anterior to its parent branch (of the posterior segmental bronchus), as it was better seen on the layer anterior to the one shown in the figure. The present layer shows the parent bronchus dividing into two small branches, both showing pathologically deformed endings in immediate relation to small solid foci. These foci are barely visible in Figure IA, one lying behind the clavicle and one over a rib.

FIGURE II.—Antero-posterior tomobronchograph. A thin-walled air-space is seen at the extreme apex, a residual lesion following active tuberculosis treated with streptomycin and isoniazid three years previously. A major branch of the apical segmental bronchus, showing slight irregular dilatation and no lateral branches, terminates with a narrowed, rounded end in immediate relation to the lesion. The nature and situation of the air-space made it more or less invisible in the plain films.

FIGURE IIIA.—Antero-posterior tomograph of a triangular, apparently solid lesion, immediately below a plombe. Lateral radiographs did not show the opacity separate from the plombe.

FIGURE IIIB.—Antero-posterior bronchograph. This does not show the lesion clearly, and other views were less helpful. Superficially, the bronchial tree shows little abnormality other than crowding and distortion.

FIGURE IIIC.—Antero-posterior tomobronchograph. An upper lobe segmental bronchus leads directly into the triangular lesion, which is irregularly filled with contrast medium.

OSTEOARTHRITIS WITH EMPHASIS ON THE TREATMENT OF THE KNEE JOINT.

By T. W. BURGESS, M.B., Ch.M.,

Sydney.

OSTEOARTHRITIS, also known as hypertrophic or degenerative arthritis, is the commonest of the arthritic diseases. It is slowly progressive with age and irreversible, but rarely causes severe crippling. In the past it has been neglected, and perhaps its insidious onset, with stiffness usually the first symptom, coupled with its low mortality, may be the chief reason for this neglect.

Ætiology.

When looking for causes of this disease one must realize that the underlying and principal factor is a degenerative one, which may be influenced in several ways. Heredity is considered to play an important part in some, especially in women with Heberden's nodes. Some physicians still adhere to the view that infection, of either a general or

a focal nature, has importance. The evidence in favour of this is negligible (Fletcher, 1947). There is a lack of signs of constitutional disturbance, fever and tachycardia are seldom seen, the white cell count is usually normal, and the blood sedimentation rate remains low; all these support the view that infection is not the cause. Ankylosis never occurs.

Trauma is an important cause in many cases and, surprisingly, a minor injury is more often responsible than a major one.

Excessive body weight is a very important contributing and influencing factor on the weight-bearing joints.

Strain due to malalignment or occupation is another contributing cause, undue stress being placed on the joint and cartilage involved.

Endocrine and metabolic factors have been incriminated. The endocrine changes occurring at the menopause have been considered for many years as influencing osteoarthritis, and hypothyroidism has been postulated as a possible cause of this disease; but no real evidence exists to substantiate this (Copeman, 1955).

Unlike rheumatoid arthritis, and apart from Heberden's nodes, which occur more commonly in the female (10 times more common in women than in men—Strecher, 1940), there seems to be no obvious sex incidence.

The Knee Joint.

In the treatment of osteoarthritis of the knee joint it is important to explain clearly the nature of the disease and to reassure the patient that considerable relief can usually be given and its progress retarded.

First, it is essential that any of the predisposing or contributing causes mentioned above should, as far as possible, be eliminated; thus a change of occupation may be needed and postural malalignment may require correction. The knee joint is one of the most frequent sites for osteoarthritis. This is very common in women aged between 40 and 55 years, and is often associated with obesity and hypertension. Frequently considerable pain and stiffness are present, with limitation of movement, causing difficulty in walking, especially on negotiating stairs. There is grating of the patella, and the crepitus in the joint is coarse and frequently easily audible. Enlargement of the ends of the bones and proliferation of the synovium are common in advanced cases, and in consequence the joint is considerably swollen and the adjacent muscles and tendons become painful and tender.

X-ray examination in the early stages reveals pointing of the margin of the articular surfaces, especially of the superior and inferior aspects of the patella and of the tibial spines. Diminution of the joint space follows, with increased density of the subchondral bone.

Physical Therapy.

By far the greatest assistance, both in prevention and in treatment, is obtained in the field of physical medicine (Baker, 1957). If obesity is present, as is so often the case, then correction of this is the next and most important step to take in conjunction with any other form of treatment.

The aims of physical treatment are mainly to produce symptomatic relief, maintain muscle tone and keep a sufficient range of movement in the affected joint so that it can function satisfactorily. It is understandable, therefore, that heat in some form is useful in relieving muscle spasm, and of the various methods of applying it short-wave therapy is the most effective.

Histamine Ionization.

Histamine ionization or iontophoresis appears to be the most beneficial of all the treatments, and for this reason it is proposed to give a fuller account of the method of applying it. In spite of what has been written concerning the aims of physical treatment to produce symptomatic relief, histamine ionization has, in most cases, given considerable relief, often lasting for several years. The value of introducing ions into the tissues by this method for therapeutic purposes is dependent upon the greater penetration of the substances into the tissues than is usually secured by topical application of the same remedies. Ions with a positive charge—metals and alkaloids—are introduced into the tissues from the positive pole, while ions with a negative charge—iodine, chlorine and acid radicals—are introduced from the negative pole. The application of this ion transfer of drugs into the body can be utilized in many departments of medicine and has been neglected in the past, but is now steadily finding increased employment.

Technique.—A galvanic current generator is essential, and one of two methods is available—using either (i) two fixed electrodes or (ii) one fixed larger inactive electrode and a smaller movable active electrode of the button type. The latter method is preferable, as it affords better control of the dosage. The patient sits or reclines on a couch with the legs straight out in front. The anterior medial and lateral surfaces of the knee are lightly smeared with 1% histamine ointment, and the larger inactive electrode from the negative pole of the generator is placed under the lower part of the thigh posteriorly. A small button electrode covered with several layers of wet gauze is used as the active positive one, and this is slowly moved over the part to be treated. It is advisable to use a weak current strength of not more than three milliamperes for a total of three minutes for the first time, and to watch the patient closely for any severe general reaction, such as dizziness, headache or severe flushing of the skin of the face and neck. If there is no adverse reaction, the subsequent treatments can be gradually increased up to 10 milliamperes for five minutes to each knee at the one time. The treatment is usually given three times a week. A rapid dilatation of the capillary blood vessels ensues, causing a formation of weals. As soon as a weal appears it is advisable to discontinue the treatment at that site and move the electrode to another position. A few minutes is sufficient to cause intense hyperæmia, weal formation and large patches of urticaria over the area under treatment. Prolonged or excessive administration may result in an increase of the pulse and metabolic rate, a fall of the blood pressure, a sensation of flushing and heat around the head and neck, and severe headache. Contraindications are a history of bronchial asthma and marked hypertension. Treatment is also applied to the paravertebral area from the twelfth thoracic to the third lumbar level.

Hydrocortone Intraarticular Injection.

It is found that the best response to the intraarticular injection of hydrocortone is in those knee joints that are painful and distended with synovial fluid. As much of the fluid as possible is withdrawn by a syringe, and then a solution of 25 to 50 milligrammes of hydrocortone is injected into the joint space. This is given weekly, and usually three or four times are sufficient. Great relief is obtained in these cases and the pain usually disappears. The amount of relief seems to be in direct ratio to the amount of excess synovial fluid present.

Ultrasonic Therapy.

Ultrasonic treatment is effective, but unless the knee is sufficiently swollen for the contours to be rounded and pliable, it is difficult to apply the sounding head directly onto the skin surface and move it around with ease. There are other methods of using ultrasonic therapy, such as the aquatic method and the water cushion (Buchtala's method), but these are not so convenient. When satisfactorily applied, ultrasonic treatment can afford considerable relief to any painful joint, as it is a most effective method of relieving pain and muscle spasm. For this reason it is rapidly becoming increasingly acknowledged as a most useful addition to physical medicine. The use of ultrasonic treatment is not without its dangers, and considerable care must be taken at all times, otherwise it is easy to give an overdose, causing increased pain or even tissue necrosis.

Other Forms of Treatment.

Massage is given to the muscles and tendons around and near the joint, especially the quadriceps muscle, which usually loses its tone, weakens and wastes rapidly and

quite early. This muscle should be strong and well developed, as it controls the movement of the joint and gives a feeling of security.

Exercises are also used to strengthen the quadriceps muscle. As this muscle does not hold the knee in full extension in the weight-bearing position, and as the femur is balanced upon the tibia with minimal muscular assistance, it is important that full extension of the joint is obtained. Exercises when necessary are given with this object in view.

Rest is most important when pain is at all severe, and especially in bed with proper support. Complete rest in bed is not usually desirable otherwise, but on the other hand over-use is most undesirable. Advice on the correct amount of exercise is important, and varies with the patient's condition; but it is better to advise too little rather than too much.

For those patients who are overweight, as many are, a reducing diet is most important, and every endeavour should be made to reduce the weight to as near normal as is compatible with the well-being of the patient.

Medical treatment is symptomatic, but quite important when pain is present. Any well-tried drug capable of giving relief, such as aspirin, "A.P.C." or Tabs. Codein Co. B.P., is very beneficial.

Summary.

Osteoarthritis is discussed, and a brief outline is given of the diagnosis and cause. Treatment of the knee joint is considered in somewhat more detail, with stress on physical medicine in general and histamine ionization in particular. It is thought that the condition has been somewhat neglected in the past, but that with the advent of recent methods of treatment the lot of many sufferers from this complaint may be made easier.

References.

BAKER, F. (1957), "Physical Medicine and Degenerative Joint Disease", *Brit. J. Phys. Med.*, May, 1957.

COPEMAN, W. S. C. (1955), "Textbook of the Rheumatic Diseases".

FLETCHER, E. (1947), "Medical Disorders of the Locomotor System".

STRECHER, R. M. (1940), "Heberden's Nodes: Heredity in Hypertrophic Arthritis of the Finger Joints", *J.A.M.A.*, 115: 2054.

MURRAY VALLEY ENCEPHALITIS: THE DISTRIBUTION OF HUMAN ANTIBODIES IN THE UPPER MURRAY REGION OF SOUTH AUSTRALIA IN 1955.

By PETER WARNER,

with the technical assistance of BRIAN MOORE.

(From The Institute of Medical and Veterinary Science, Adelaide.)

SINCE 1951 there has been no epidemic of encephalitis in the Murray Valley. Anderson and Eagle (1953), and Anderson, White and McLean (1954) provided evidence that the Murray Valley encephalitis (MVE) virus had not been present in the region of Mildura in 1951-1952 and 1952-1953. Miles (1955), investigating human sera collected at the end of 1953, found no evidence of the presence of MVE virus in the South Australian Murray Valley.

It was decided to reinvestigate the distribution of human antibodies to the MVE virus in the Upper Murray region of South Australia for the following reasons: firstly, to see whether there was evidence of human infection with MVE virus in 1954-1955; secondly, to see whether there had been an alteration in the distribution of MVE antibodies since the previous survey in 1953 (Miles, 1955); thirdly, to detect any marked variation in the incidence of antibodies in the different parts of the Upper Murray region in South Australia; fourthly, to determine the length of time during which antibodies persist. Consequently, in December, 1955, an expedition was arranged in conjunction with the South Australian Department of Health, and human sera were collected from towns and an aboriginal settlement in the Upper Murray region of South Australia. The sera were tested for the presence of neutralizing and complement-fixing antibodies to the MVE virus. This paper describes the results obtained.

Materials and Methods.

Collection of Sera.

Blood was collected from 219 human volunteers in the towns of Barmera, Berri, Loxton, Renmark and Waikerie, and at the Gerard Aboriginal Mission. The volunteers consisted of the staffs of local hospitals, people recruited by the local general practitioners and the employees of a winery and a fruit packing shed. There was a total of 141 males and 78 females. The age groups of the white population ranged from a minimum of 15 to 19 years to a maximum of 70 to 74 years. Of the 14 aborigines or part aborigines, 10 were aged from 10 to 14 years and two from 15 to 19 years, the remaining two being elderly women. The age and sex of the volunteers were recorded, and in many instances the length of residence in the Murray Valley was also noted. The volunteers were also asked if they had been in parts of the world where there are other types of encephalitis liable to be confused with Murray Valley encephalitis in serological tests.

After the specimens of blood had been at atmospheric temperature during transportation for a period of less than six hours, they were kept at ordinary refrigerator temperature until the serum had been separated.

For comparison, 100 sera from people in metropolitan and suburban Adelaide submitted for routine Wassermann tests were tested for neutralizing activity only.

Neutralization Tests.

Screening Test.—Volumes of 0·2 millilitre of serum were incubated at 37°C. for two hours with 0·2 millilitre of a dilution of a 10% suspension of mouse brains in 10% rabbit serum saline previously infected with the Adelaide strain of Murray Valley encephalitis virus. Five or six mice were inoculated intracerebrally with 0·3 millilitre of each mixture. The dilution of virus suspension was chosen so that each dose contained less than 50 LD_{50} of virus. A titration of the suspension was performed with each batch of screening tests, and from the results it was calculated that the dose of virus used in the tests ranged from 2 to 32 LD_{50}. The mice were observed for the signs of characteristic illness, and those deaths occurring after 48 hours were recorded. Those sera which prevented the death of one-half or more of the mice surviving 48 hours after inoculation were titrated for neutralizing activity as described below.

Titration.—Volumes of 0·2 millilitre of those sera showing neutralizing activity in the screening test were mixed with equal quantities of serial tenfold dilutions of mouse brain virus suspension and incubated as described above. Each mixture was inoculated intracerebrally in volumes of 0·03 millilitre into each of five mice. With each group of sera being tested a control titration was performed, normal rabbit serum being used in place of the sera being tested. The LD_{50} of each titration was calculated according to the method of Kärber (Finney, 1952). A neutralization index was obtained by dividing the LD_{50} obtained for the control into that of the test. A neutralization index of 9 or less was classified as negative, from 10 to 49 as equivocal and 50 and above as positive.

Complement Fixation Tests.

The method used was that described by Miles and Howes (1952), who employed a benzene-extracted mouse brain antigen. All sera were first tested at a dilution of 1:5, and those showing fixation were titrated with twofold serial dilutions of a 1:5 dilution of serum.

Some sera fixing complement with this antigen were tested by the Kline test, in view of the suggestion that a proportion of the reactions are non-specific and associated with a positive serological reaction for syphilis.

Results.

The distribution of the population according to age, sex, locality and duration of residence in the Murray Valley is shown in Tables I to IV. Of 128 people the duration of

whose residence was known, 24 had resided in the Murray Valley for less than five years. Sixteen of these were aged less than 30 years, whereas eight were aged over 30 years.

All but one of the aborigines had been on the mission station for longer than five years. The single exception had been in another mission on the Murray in South Australia. None of them had been in the Northern Territory, but three had previously been on a mission station in the north of South Australia. Sera from 10 of the aborigines were submitted for the Kline test, and all gave negative results.

Neutralization Tests.

Table I shows the distribution of neutralizing antibodies according to locality. At the foot of the table it will be seen that none of 100 sera from Adelaide and suburbs had any neutralizing activity. The percentages of positive sera from the white population in the Murray Valley varied from about 4% to about 26%, and equivocal sera from 4% to 11%. However, the differenecs were not statistically significant.

The number of sera from the Gerard Mission are too small for satisfactory analysis, but 11 of 14 contained some neutralizing activity, as compared with 46 of 205 (22%) in the white population. Ten of the aborigines were aged 10 to 14 years; of these six had positive and two equivocal neutralizing indices. Four of these were aged 11 years or less (*i.e.*, they would have been in the five to nine years age group in 1953). All four had positive neutralizing indices.

TABLE I.

Distribution of Sera with Neutralizing Activity Against the Murray Valley Encephalitis Virus According to Residence of Donors.

Place.	Neutralization Test Result.		Total Sera Examined.
	Positive.	Equivocal.	
Berri	12 (16)[1]	8 (10)	77
Loxton	3 (9)	3 (9)	33
Renmark	7 (26)	1 (4)	27
Barmera	1 (4)	3 (11)	27
Waikerie	5 (12)	3 (7)	41
Total	28 (14)	18 (9)	205
Gerard Mission	6 (43)	5 (36)	14
Grand total	34 (16)	23 (11)	219
Adelaide	0	0	100

[1] Figures in parentheses are percentages to the nearest whole number.

In the white population of the area the incidence of positive neutralizing antibodies was 13·7% (28 out of 205) and of equivocal neutralizing antibodies 8·8% (18 out of 205).

Table II shows the distribution of neutralizing antibodies according to age. No age group shows marked variation in incidence except that among 72 people aged less than 30 years, seven had positive and one equivocal neutralizing antibodies, whereas among 130 sera from people aged 30 or more years, 20 had positive and 17 equivocal antibodies. There is a significantly higher incidence in the older age group. The ages of one male and two females were not recorded. Twenty-three had positive and 15 equivocal neutralization indices out of 141 sera from males, and 12 sera had positive and eight equivocal neutralization indices in females, there being no significant difference in incidence between the sexes.

Table III shows the distribution of antibodies among people whose length of residence in the Murray Valley is known. The most remarkable result obtained here is that of 24 sera from people who had spent four or fewer years in the Murray Valley, none had demonstrable neutralizing antibodies.

Of 74 people who had spent from five to 29 years in the Murray Valley, nine had positive and eight equivocal neutralizing antibodies, whereas of 30 who had spent 30 or more years in the district, eight had positive and two equivocal antibodies. Thus there is no significant difference in the incidence of antibody levels between those exposed to the 1951 epidemic only and those exposed to more than one epidemic.

Table IV shows the neutralization titres obtained for the different groups of people. There seems to be no marked difference in the distribution of titres in those exposed to one epidemic only and those exposed to more than one epidemic. The epidemic before that of 1951 occurred in 1925, so that all those living in the district for less than 30 years would have been exposed to a single epidemic. Also, all but two of the aborigines would have been exposed to a single epidemic. All those resident in the Murray Valley for longer than 30 years would have been exposed to at least two epidemics.

TABLE II.

Distribution of Sera with Neutralizing Activity Against the Murray Valley Encephalitis Virus According to Age Group of Donors.

Age Group. (Years.)	White Population.			Aboriginal Mission.		
	Neutralization Index.		Total Number Tested.	Neutralization Index.		Total Number Tested.
	+[1]	±[2]		+	±	
10 to 14 ..	—[3]	—	—	6	2	10
15 to 19 ..	3	0	25	0	2	2
20 to 24 ..	2	1	25	—	—	—
25 to 29 ..	2	0	22	—	—	—
30 to 34 ..	4	3	20	—	—	—
35 to 39 ..	2	1	19	—	—	—
40 to 44 ..	6	5	32	—	—	—
45 to 49 ..	2	4	16	—	—	—
50 to 54 ..	3	1	23	—	—	—
55 and over ..	3	3	20	0	1	2
Total ..	27	18	202	6	5	14

[1] "+"=Positive neutralization index (50 or greater).
[2] "±"=Equivocal neutralization index (10 to 49).
[3] "—"=Not tested.

TABLE III.

Distribution of Sera with Neutralizing Activity Against the Murray Valley Encephalitis Virus According to the White Population Donors' Years of Residence in the Murray Valley.

Years of Residence.	Neutralization Index.		Total Number Tested.
	+[1]	±[2]	
<1	0	0	7
1 to 2 ..	0	0	9
<2 to 3 ..	0	0	7
4	0	0	1
5 to 29 ..	9	8	74
30 to 54 ..	8	2	30
Total ..	17	10	128

[1] "+"=Positive neutralization index (50 or greater).
[2] "±"=Equivocal neutralization index (10 to 49).

Complement Fixation Tests.

Of the 219 sera examined for neutralizing antibodies, 35 were unsuitable or unavailable for complement fixation tests. Of the remaining 184 sera, 16 gave positive results to the screening test. In only one instance did a specimen of serum give a positive result to the complement fixation test and an entirely negative result to the neutralization test (Table IV). The complement fixing titre of the serum was 1 :5, the test being repeated on three occasions. The neutralization test was repeated with larger numbers of animals without any change in the result. Otherwise 11 of 24 sera with positive neutralization indices also fixed complement (Table IV); one of these was from an aboriginal. Also four of 18 sera with equivocal neutralization

TABLE IV.

Murray Valley Encephalitis Antibodies: Neutralization Indices of Sera from People in Different Groups and Comparison with Complement Fixation Results.

Neutralization Index.	Subjects Resident in Murray Valley from 5 to 29 Years.	Subjects from Aboriginal Mission.	Subjects Residents in Murray Valley for More than 30 Years.	Others.	Total.	Complement Fixation Tests.		
						Positive Response to Screening Test.	Reciprocal of Titres.	Number of Sera Tested.
0 to 9	57	3[1]	20	82	162	1	5	142
10 to 49	8	5[1]	2	8	23	4	20, 10, 5, 5[2]	18
50 to 99	3	1	3	3	10	2	5	8
100 to 499	4	4	3	6	17	7	20, 10, 5, 5[2]	9
500 and over ..	2	1	2	2	7	2	20, 10	7

[1] One of these aborigines was older than 55 years.
[2] Aboriginal.

indices fixed complement; one of these was from an aboriginal. Twelve of the 16 sera were titrated; six had a titre of 1 :5, three a titre of 1 :10 and three a titre of 1 :20 (Table IV).

Thus, in the white population, the serum of 14 out of 182, or 7·7%, fixed complement in the presence of MVE virus mouse brain antigen.

There was no apparent correlation between the complement fixation titre and neutralization index; nor was it obvious that a greater number of sera with high neutralization indices reacted positively to the complement fixation test.

Of 10 sera reacting positively to the complement fixation test, none gave a positive reaction to the Kline test.

Seven sera of 72 tested from people aged 29 years or younger had complement fixing antibodies, and 9 of 112 from people aged 30 or more years.

There were no sera which fixed complement from 21 people resident in the district for less than five years. Five of 59 sera from people resident in the district from 5 to 29 years fixed complement, and five out of 23 sera from residents of 30 or more years.

Discussion.

The results described in this paper show in the first place that no antibodies were detected in Adelaide; this finding is in agreement with that of Miles and Howes (1953), who found a negligible incidence. The incidence of positive neutralizing antibodies in the white population of the Murray Valley was 28 out of 205 sera tested, which is comparable to the results obtained by Miles (1955) on sera collected in 1953; they found 24 positive neutralizing sera out of 200 tested. If we take the number of sera which fix complement and which also have positive neutralization indices (these appear to be the appropriate figures for comparison with Miles's results—1955), there are 10 out of 205, as compared with three out of 200 for the 1953 survey (Miles, 1955), and four out of 116 for the late 1952 and early 1953 survey in the Victorian Murray Valley (Anderson, White and McLean, 1954). None of these three sets of figures differ significantly from one another. However, if we take the total number of positive complement fixing sera in the white population, our figures (14/205) do seem to be somewhat higher than those obtained previously; but we cannot be sure that this difference is not attributable to the differences in sampling methods and techniques used in the different surveys. On the whole, it seems reasonable to conclude that there has been no marked change in the incidence of antibodies to the MVE virus in the white population of the Murray Valley since 1953.

Our results show also that there is no significant variation in the incidence of neutralizing antibodies among the white populations of different towns in the Upper Murray region of South Australia. Renmark, Berri, Barmera and Loxton all lie within a radius of about 13 miles, with Berri at the centre. In between these towns are small settlements, and presumably the movements in this area would be fairly free; for this reason one would not necessarily expect to detect a localizing influence. Waikerie, however, is separated by a distance of some 30 miles from the previous group and lies further from the Victorian border. Here there was no suggestion that the incidence of antibodies was different from that found in the other towns. It is of interest to note that Miles's survey in 1953 (Miles, 1955) was based on observations made on sera obtained from the Waikerie district. Hence, in the region we have surveyed there is no evidence that the incidence of antibodies falls off with increasing distance from the Victorian border, as was originally suspected by Miles (1955) from results obtained earlier (Miles and Howes, 1953).

All the towns we have investigated are similar, in that all consist of irrigation settlements, mainly concerned with the cultivation of grapes and fruit trees, especially of the citrus variety. It might be expected that the bird and insect life would be similar throughout such a region, and it follows that it is likely that the incidence of antibodies to the MVE virus would also be similar throughout. A more interesting comparison would be between the incidence of antibodies in the region of the present survey and that in the Lower Murray region in the neighbourhood of Mannum, Murray Bridge and Tailem Bend; these lie within a radius of 20 miles of one another, and are over 50 miles away from the towns we have investigated. The main occupations in the Lower Murray region are dairying and the cultivation of lucerne on large reclaimed swamps.

In this connexion it is of interest to note that the observations (Miles and Howes, 1953) which led to the suggestion that the incidence of antibodies fell off with distance from the Victorian border, were made on sera some of which were obtained from the Lower Murray region. The importance of determining this problem is that if there is a difference in the incidence of MVE antibodies in sera from the Upper and Lower Muray regions, then a comparative study of the bird and insect population of the two districts may indicate possible vectors and reservoirs of the MVE virus.

Among the few sera obtained from aborigines or part-aborigines of the Gerard Mission, the incidence of neutralizing antibodies was higher than in the white population. Although the numbers were too few for satisfactory statistical evaluation, there are other reasons for thinking that the antibody incidence was really higher than in the white population. The mission is situated on the edge of the river, and the inhabitants and their children spend a great deal of their time in the open and on the river's edge, and are consequently exposed to biting insects to a much larger extent than the white population. Thus the inhabitants of the mission would be expected to be more heavily infected with the MVE virus. This finding would be in keeping with those of Miles and Howes (1953), of Beech, Howes and Miles (1953) and of Miles and Dane (1956), who also found a high incidence of antibodies among aborigines in the Northern Territory. Our results suggest that the higher incidence among aborigines may be at least partially explained by their greater exposure to biting insects in regions where the MVE virus has been present on one or more occasions.

Another interesting feature is that of four aboriginal children who would have been aged nine years or younger in 1953, all had positive neutralization indices, whereas Miles (1955) found only one positive result out of 45 sera

collected from white children of the same age group in 1953. Of the explanations given by Miles for his finding, the most likely seems to be that the young white children from families of the type that are likely to volunteer to give blood are protected from insects and kept from the river during the encephalitis season. Though a racial difference cannot certainly be excluded, these results suggest that considerable protection of children may be achieved by such simple measures as excluding them from biting insects and keeping them from the river.

Among the white population tested by us, there were none below the age of 15 years, and the antibody incidence seems to be evenly distributed among the age groups. However, the incidence in those aged 30 years or older seemed to be greater than in those aged under 30 years. This difference appears to result from the fact that newcomers to the district within the previous five years, who are without antibodies, are twice as numerous in the younger age group. This is supported by the fact that the incidence of antibodies in those whose period of residence is less than 30 years is not different from the incidence in those whose period of residence is greater. Thus, the difference cannot be related to exposure to one or more epidemics of encephalitis.

The most striking finding reported here is that, among those whose period of residence is known, none who had been in the Murray Valley for less than five years had either neutralizing or complement fixing antibodies to the MVE virus in their serum. This indicates that the human population had suffered very few or no silent infections with MVE virus since the last known epidemic. This is in agreement with the finding of Anderson (1954) and Miles (1955). This finding also suggests that this method of determining the date of a previous epidemic is satisfactory, in contrast to the finding of Miles (1955), that examination of sera from white children did not enable him to determine the date of the previous epidemic.

Since there is evidence that MVE virus had not infected human beings in the Murray region since the last epidemic in 1951, the antibodies detected by us must have persisted for at least four years. It is known with reasonable certainty that neutralizing antibodies persist for as long as 35 years (McLean and Stevenson, 1954). However, it is not known how long complement fixing antibodies persist. Our results suggest that they may last at least four years; hence the presence of complement fixing antibodies in an individual's serum does not necessarily indicate recent infection.

The specificity of the complement fixation test in this series does not seem to be in much doubt. Only one positive result was obtained from 142 sera which entirely lacked neutralizing activity, whereas four out of 18 equivocal and 11 out of 24 positive neutralizing sera contained complement fixing antibodies. Thus, it may be said that occasionally a false positive result may be obtained from the complement fixation test if we accept neutralizing activity as our criterion of past infection with MVE virus. However, it is also clear that we have obtained positive results to the complement fixation tests from sera which had only equivocal neutralizing activity. This is in contrast to the finding of Miles (1955) that no fixation of complement was obtained with sera neutralizing less than 50 LD_{50} of virus; this corresponds approximately with the sera described as positive in this paper.

Summary.

In December, 1955, human sera were collected from the Upper Murray region of South Australia. Serum was taken from 205 white people resident in five towns and from 14 members of an aboriginal mission, and tested for neutralizing and complement fixing antibodies to the Murray Valley encephalitis (MVE) virus. The incidence of antibodies among the white population did not differ from that revealed by a survey in 1953 carried out by Miles (1955). None of the sera from white people who had come to the Murray Valley since the last known epidemic in 1951 contained antibodies to the MVE virus, whereas a proportion of sera from all age groups resident in the region for five or more years contained antibodies. This finding, combined with the unchanged incidence of antibodies, showed that the MVE virus had not infected the human population since the last epidemic.

There was no regional variation in the incidence of antibodies in sera from people resident in the five towns surveyed.

Among members of an aboriginal mission, including the children, there was a high incidence of antibodies. The results show a marked contrast with previous findings in white children, and suggest that children have been protected from infection with MVE virus simply by avoiding excessive exposure to biting insects.

Both neutralizing and complement fixing antibodies persist for at least four years. Hence the presence of complement fixing antibodies in an individual serum is not necessarily indicative of recent infection.

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References.

ANDERSON, S. G. (1954), "Murray Valley Encephalitis and Australian X Disease", *J. Hyg.*, 52: 447.

ANDERSON, S. G., and EAGLE, M. (1953), "Murray Valley Encephalitis: The Contrasting Epidemiological Picture in 1951 and 1952", M. J. AUSTRALIA, 1: 478.

ANDERSON, S. G., WHITE, J., and MCLEAN, D. M. (1954), "Absence of Murray Valley Encephalitis Virus from Murray Valley, 1952-1953", M. J. AUSTRALIA, 1: 113.

BEECH, M., HOWES, D. W., and MILES, J. A. R. (1953), "Observations on Serum from Aborigines in the Northern Territory of Australia: II. Antibodies Against Murray Valley Encephalitis (X Disease), Psittacosis and Q Fever", M. J. AUSTRALIA, 2: 776.

FINNEY, D. J. (1952), "Statistical Method in Biological Assay", 1st Edition, Griffin, London: 524.

MCLEAN, D. M., and STEVENSON, W. J. (1954), "Serological Studies on the Relationship between Australian X Disease and the Virus of Murray Valley Encephalitis", M. J. AUSTRALIA, 1: 636.

MILES, J. A. R. (1955), "A Note on the Persistence and Distribution of Antibodies to Murray Valley Encephalitis in Man in South Australia", M. J. AUSTRALIA, 1: 1.

MILES, J. A. R., and DANE, D. M. S. (1956), "Further Observations Relating to Murray Valley Encephalitis in the Northern Territory of Australia", M. J. AUSTRALIA, 1: 389.

MILES, J. A. R., and HOWES, D. W. (1952), "An Encephalitis Virus Isolated in South Australia: II. Serological Observations on the Virus and its Relation to other Arthropod-borne Encephalitides", *Australian J. Exper. Biol. & M. Sc.*, 30: 353.

MILES, J. A. R., and HOWES, D. W. (1953), "Observations on Virus Encephalitis in South Australia", M. J. AUSTRALIA, 1: 7.

THE MORTALITY IN AUSTRALIA OF YOUNG ADULTS.

By H. O. LANCASTER,

School of Public Health and Tropical Medicine, Sydney.

THIS paper analyses the mortality in Australia of young adults, using data from *Demography*, the annual bulletin of the Bureau of Census and Statistics, Canberra.

Definitions.

For the purposes of this paper we define young adults as persons aged from 15 to 24 years last birthday. The numbers of deaths assigned to this age group by the official statisticians have been affected by wartime practices, as has been pointed out by Lancaster and Willcocks (1950). Briefly, during the first World War, deaths of

defence personnel occurring in Australia were registered and counted in the official statistics. During the second World War deaths of defence personnel in Australia were not entered into the official statistics. In the first World War, defence personnel going abroad were considered in the same way as emigrants and hence were not counted as belonging to the Australian population during their time overseas, and their deaths do not appear in the official statistics. During the second World War, no corrections were made to the published populations to distinguish civil from defence populations. Thus the populations at risk, formed from the populations given in *Demography*, are an over-estimate. It is doubtful whether any corrections can be made which will give a true population at risk, especially as the transfer from civil population to the defence services was selective. I have, therefore, used the published numbers which give the estimated populations as if there had been no second World War. The general effect will be to give rather higher rates in the period from 1911 to 1920 and lower rates for the period from 1941 to 1945 than would have been recorded in the absence of war. The rates from violent and accidental deaths for the period 1941 to 1945 will be especially affected. However, in neither of the periods, 1911 to 1920 or 1941 to 1950, will the mortality rates be grossly affected, since only a proportion of the years were war years. An additional complication affected this age group, especially in the earlier years, say 1881 to 1890; deaths of indentured labourers (kanakas) in Queensland are included in the official statistics (Cumpston, 1931). Even in the period 1911 to 1920 a number of deaths of non-resident Asian pearl divers are included, these deaths often being due to vitamin deficiency diseases.

The Mortality from All Causes.

In Table I and Figure I are given the death rates of young adults for various periods from 1881 up to 1955, the latest year available. At the beginning of this period the male death rates were almost seven per thousand *per annum* and the female almost five per thousand *per annum*. There have since been substantial declines in the rates for the years 1951 to 1955; they are less than two per thousand *per annum* for males and 0·7 per thousand *per annum* for females. Thus the rates over the period of 75 years had fallen to about one-quarter of their former values for males and to one-seventh of their former values for females. But in recent years there has been a reversal of this trend in males, for the male rates in the period 1951 to 1955 were actually higher than they had been in the period 1946 to 1950. Owing to the difficulties of interpretation of the wartime rates, mentioned above, the male rates for the period 1941 to 1945 have to be read with reserve, as they are perhaps spuriously low. The rates were thus 1·379 per thousand *per annum* in the years 1941 to 1945 and 1·602 per thousand *per annum* in the years 1946 to 1950. The corresponding rates for females were 1·208 and 0·857.

TABLE I.

The Mortality of Young Adults (Aged 15 to 24 Years) in Australia.

Period.	Deaths per Million *per Annum*.		Masculinity of the Death Rates.[1]	Masculinity of the Death Rates (Excluding Violence).
	Males.	Females.		
1881 to 1890 ..	6637	4990	133	—[2]
1891 to 1900 ..	4540	3802	119	—
1901 to 1910 ..	3539	3201	111	—
(1908 to 1910)[3] ..	(3036)	(2934)	(103)	(81)
1911 to 1920 ..	3128	2761	113	90
1921 to 1930 ..	2468	2176	113	81
1931 to 1940 ..	2099	1642	128	79
1941 to 1950 ..	1489	1036	144	81
(1941 to 1945) ..	(1379)	(1208)	(114)	(75)
(1946 to 1950) ..	(1602)	(857)	(187)	(91)
1951 to 1955 ..	1746	659	265	106

[1] The masculinity is defined here as 100 times the male mortality rate divided by the corresponding female rate.
[2] Not available.
[3] The rates in parentheses are for a part of a period already considered in Table I.

In Table I are also given the masculinities of the rates for each period. As usual, the masculinity is defined as the ratio of the male mortality to the female, multiplied by 100 to avoid decimals. Over most of the period considered, that is from 1891 to 1940, the masculinity varied between 111 and 128. There has been a rise since 1940, and in the years 1951 to 1955 the masculinity was 266. This change has been brought about by the increasing importance of the deaths due to violent and accidental causes, by the virtual disappearance of tuberculosis, which at these ages has usually fallen more heavily on the females, and by the great fall in the death rates from causes associated with child-bearing. On the other hand, if deaths due to violent and accidental causes are excluded, the male rates are more favourable except in the most recent period and usually the masculinity has been about 80. The mortality from child-bearing and the higher tuberculosis rates in females have been responsible for this.

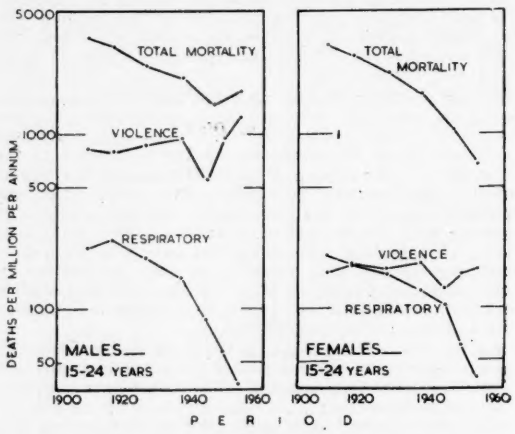

FIGURE I.

The trends in total mortality, and mortality from violence and respiratory disease, of young adults in Australia.

Infective Disease.

It is convenient to class under the heading of infective diseases all those diseases of Class I of the Fifth Revision of the "International List of Causes of Death", less tuberculosis and syphilis, and to add in all deaths due to meningitis, encephalitis and brain abscess from the class of diseases of the nervous system, and those due to gastro-enteritis from the class of diseases of the alimentary system. The mortality of infective disease, so defined, had fallen in the years 1951 to 1955 about one-sixth of its value in the years 1908 to 1910.

We may consider the individual diseases.

Typhoid and Paratyphoid Fever.

In earlier days this group of diseases, the enteric fevers, was an important cause of mortality (see Figure II and Table II). It was especially associated with pioneering conditions, according to Cumpston and McCallum (1927), from whom a quotation is given in Lancaster (1953).

Gastro-Enteritis, Dysentery and Other Infections of the Bowel.

These diseases have not been associated with any great number of deaths in this age group. They have been responsible for about one-tenth as much mortality as typhoid (see Lancaster, 1953).

TABLE II.

The Mortality of Young Adults in Australia from Infective Diseases: Deaths per Million Years of Life per Annum.

Period.	Typhoid and Paratyphoid.		Meningitis.		Influenza.		Poliomyelitis.		Infective Diseases.[1]		Tuberculosis.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
1908 to 1910	306	201	55	53	15	20	—[2]	—	509	369	582	934
1911 to 1920	176	118	126	61	177	154	—	—	605	436	529	762
1921 to 1930	60	42	36	23	35	31	5	3	220	174	373	642
1931 to 1940	12	9	21	9	31	24	11	7	138	92	197	373
1941 to 1945	3	2	39	20	8	3	6	5	95	76	132	239
1946 to 1950	1	1	8	6	5	4	30	14	81	53	64	140
(1941 to 1950)	2	1	24	13	6	3	17	9	87	64	98	190
1951 to 1955	0	1	5	6	5	2	42	25	84	60	18	27

[1] Other than tuberculosis and syphilis, including all other forms of meningitis and encephalitis and brain abscess and gastro-enteritis.
[2] Not separately listed in the International List of Causes of Death.

Cholera and Typhus.

Cholera has not occurred in Australia over the years since 1900 at any rate. Typhus, in the form of murine typhus in the ports of the south, and of scrub and tick-borne typhus in the northern areas, has never been a numerically important cause of mortality.

Measles, Whooping-Cough, Diphtheria, Scarlatina.

These diseases have caused but few deaths in this age group throughout the period of the survey, since their incidence tends to be greatest in infancy and early childhood.

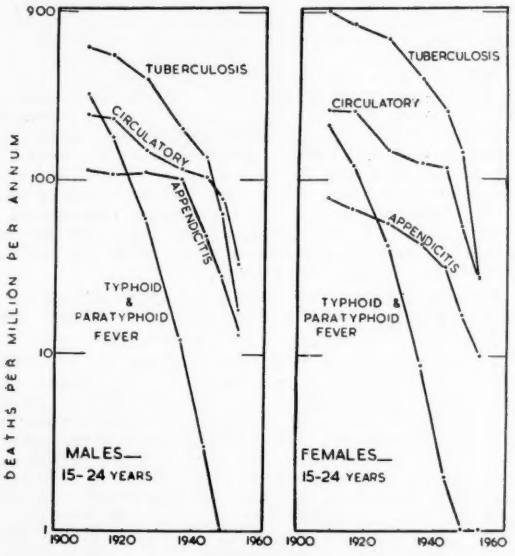

FIGURE II.

The trends in mortality from certain selected causes of young adults in Australia.

Meningitis.

The deaths from all forms of non-tuberculous meningitis have been gathered under one heading, as it is impossible to form an idea of what proportions of meningococcal meningitis have been assigned to the rubric in Class I under the rules of the International List in the different periods. The influence of the two World Wars is evident in the rise in the meningitis death rates in the periods containing them.

Encephalitis and Brain Abscess.

This group has caused less deaths than the meningitides, and there has not been any marked downward trend in the incidence.

Poliomyelitis.

Deaths due to poliomyelitis cannot be identified in the official statistics before 1922. Since that time there has been no definite trend, although the rates are higher since 1946, owing to epidemics, especially an epidemic lasting from September, 1949, to October, 1951 (Lancaster, 1954). It is usually conceded nowadays that there has been an age shift in the age of infection from infancy (Burnet, 1952). Concluding this section, we may say that Table II shows a great decline in the mortality from infective disease, defined as above. About three-quarters of the deaths from these infective diseases in the earlier periods were due to typhoid, meningitis, poliomyelitis and influenza. In the later years of the survey none of the diseases above has been an important cause of death.

Tuberculosis.

Tuberculosis has been treated in my survey (Lancaster, 1950) separately from the other infective diseases, because of special problems associated with its chronic nature. The declines before 1945 may be considered to be due to declining infection rates in childhood and adolescence, and so to general factors rather than to specific medical measures. But after 1945 the decline has been greatly accelerated, and it seems reasonable to ascribe this part of the fall to chemotherapy, antibiotics, case finding and other measures of control. To illustrate the change in the rate of decline we may consider the deaths in the two sexes combined from 1941 to 1955. There were recorded 242, 261, 207, 224, 213 in the years 1941 to 1945, and then in the following years 188, 155, 116, 80, 72, 53, 46, 12, 15, 9. At these ages the Australian females have suffered greater mortality than the males. This excess has been noted in other countries, but the reasons for it are obscure.

Certain Other Causes of Death.

Diabetes.

Diabetes has never been a numerically important cause of death at these ages, but there has been a tendency for the rates to fall, as can be seen in Table III.

Diseases of the Nervous System.

The class of diseases of the nervous system of the International List for most revisions before the sixth included meningitis, encephalitis and brain abscess; these I have transferred to the infective diseases and the syphilitic diseases of the nervous system, which I have treated under the separate heading syphilis. The remaining causes of death I have grouped together in Table III as diseases of the nervous system.

There has been a marked decline in these diseases. In the latest period the diseases of this system responsible for the mortality at these ages are cerebral hæmorrhage (especially subarachnoid hæmorrhages) and epilepsy. In earlier times there were deaths due to "other diseases of the spinal cord" and to "other diseases of the nervous system" whose nature is now rather speculative. However, in the former was included poliomyelitis, and no doubt a good number of infections were included in both of these indefinite categories.

TABLE III.

The Mortality of Young Adults in Australia from Diseases of Certain Systems: Deaths per Million per Annum.

Period.	Diabetes.		Nervous Diseases.[1]		Diseases of the Circulatory System.		Diseases of the Respiratory System.[2]		Diseases of the Genito-Urinary System.		Puerperal Diseases: Females.
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	
1908 to 1910	25	22	152	138	235	247	218	158	122	150	291
1911 to 1920	35	26	139	115	224	244	248	175	133	174	301
1921 to 1930	26	30	118	100	145	146	198	155	117	159	291
1931 to 1940	14	22	93	72	114	121	150	125	99	138	238
1941 to 1945	12	20	83	54	103	113	86	101	73	85	167
1946 to 1950	7	13	73	53	77	54	57	62	59	56	103
(1941 to 1950)	10	17	78	54	90	84	72	82	66	71	136
1951 to 1955	7	8	56	45	33	27	37	40	46	40	60

[1] Excluding meningitis and encephalitis and brain abscess.
[2] Excluding influenza (when relevant).

Diseases of the Circulatory System.

These are defined consistently in the various revisions of the International List up to 1950. After 1950 in Australia, in accordance with the adoption of the sixth revision of the list, rheumatic heart disease was separated out into a distinct group; thus the figures for the years 1951 to 1955 are not really comparable with those of earlier years. Noting this, we may ascribe the improvements in this class to changes in incidence and treatment of rheumatic fever and its late effects.

Diseases of the Respiratory System.

Deaths in this class of the International List at this age are almost all due to infective diseases. The mortality rates have shown a steady decline, accelerated after 1945.

Genito-Urinary Disease.

In young adults genito-urinary disease in the International list consists almost entirely of acute and chronic nephritis. The decline is probably linked with the declines in infections such as scarlet fever, which have been evident over the period of the survey.

Diseases of Child-Bearing.

Considerable gains have been made by the females in these diseases and in accidents associated with child-bearing. The rates have moved downwards since the war, even though the fertility rates have remained high.

Diseases of the Alimentary System.

These are the diseases of the class of the same name of the International List, less gastro-enteritis. Appendicitis has caused about half the deaths in this group in every period. The mortality rates are displayed in Table IV. There has been a steady fall in the mortality from these diseases.

Violent and Accidental Deaths.

The mortality from violent and accidental causes, which may be briefly described as violence, has always been an important part of mortality at this age, especially for males. With the decline in mortality from other causes, violence has become increasingly important relatively, until in the latest period it accounts for over 70% of all mortality. Although the female rates have shown little change, the male rates show an increase in the latest period and, indeed, are now higher than at any time since 1908. The rates in the period 1941 to 1945 and also for the period 1941 to 1950 may be regarded as being spuriously low, owing to the wartime practices. About 60% of the accidental and violent deaths at this age are due to motor vehicle accidents in either sex, about 10% are due to suicide, and about 10% are due to drownings. In Table V the death rates from individual forms of violence are given for the years 1931 to 1940 and for the years 1951 to 1955. The rates for the years 1931 to 1940 have been computed from Lancaster (1952), in which there is an error. The death rates for females at ages 15 to 19 years, in Table VII of that paper, for other and unstated causes should be 8 and not 81 per million *per annum*. Table V shows that mortality from violence is dominated by the deaths from automobile accidents, with drowning and suicide next greatest causes for males, and suicide and drowning the next greatest causes for females. There has been some change in the assignments of deaths to the different causes with the coming into use of the sixth revision of the International List, but for most causes the surprising feature appears to be the similarity of the rates in the two periods.

Railways.—There has been a moderate decline in the deaths associated with railway transport. These deaths will include both employees and passengers.

Automobiles.—These death rates include all accidents in which a motor vehicle was involved. The person killed may have been in the motor-car, motor-bicycle, omnibus or other motor vehicle as passenger or driver, or may have been on the roads as a pedestrian or pedal bicycle rider. It is evident that the rates have been doubled in the males over the 15 years or so between the periods. The female rates are less than one-sixth the male rates in either period. One especial hazard is the motor-bicycle, and Lane (1953) gives a figure of 8·89 motor cyclist deaths

TABLE IV.

The Mortality of Young Adults in Australia from Diseases of Certain Systems; Deaths per Million per Annum.

Period.	Appendicitis.[1]		Diseases of the Alimentary System.		Violent and Accidental Causes.		All Other Causes (Excluding Violent and Accidental Causes).	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
1908 to 1910	113	79	194	186	809	199	2227	2735
1911 to 1920	108	67	188	156	793	174	2335	2587
1921 to 1930	110	56	189	123	844	165	1624	2011
1931 to 1940	101	43	157	92	937	177	1162	1465
1941 to 1945	48	32	78	78	(575)	134	804	1074
1946 to 1950	28	17	55	47	967	155	635	702
(1941 to 1950)	38	24	67	63	(768)	144	721	892
1951 to 1955	13	10	32	32	1227	166	519	493

[1] The deaths from this cause are also included in diseases of the alimentary system.

ILLUSTRATIONS TO THE ARTICLE BY BRYAN GANDEVIA, M.D., M.R.A.C.P.

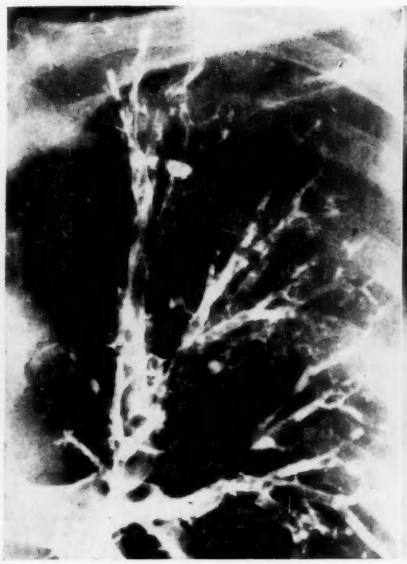

FIGURE IA.

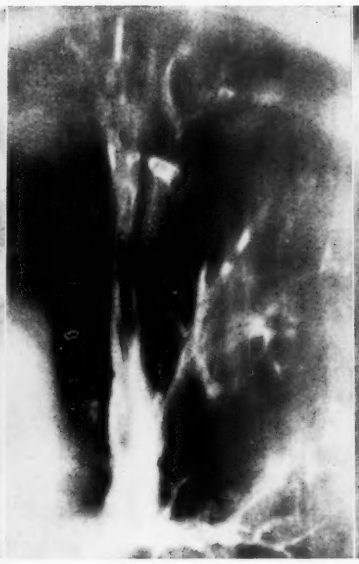

FIGURE IB.

FIGURE II.

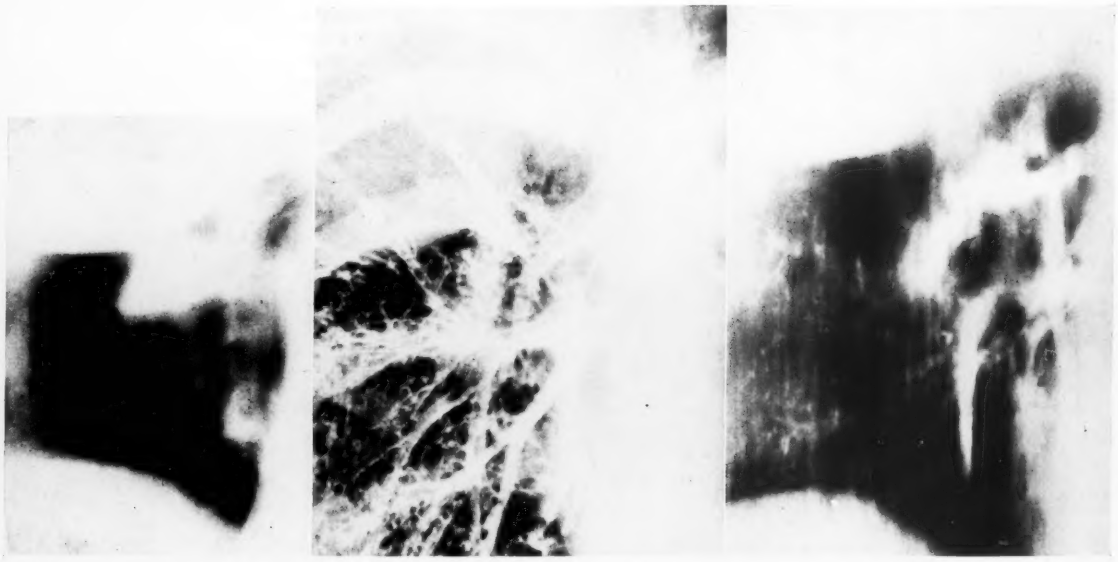

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FIGURE III.

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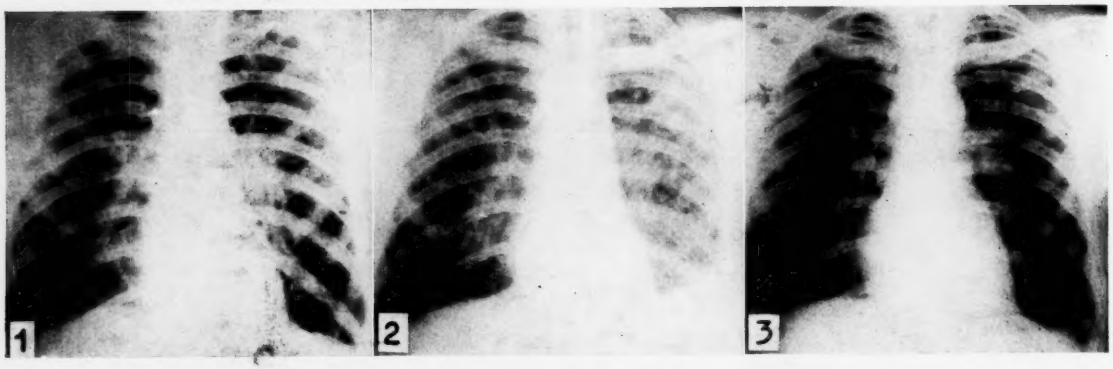

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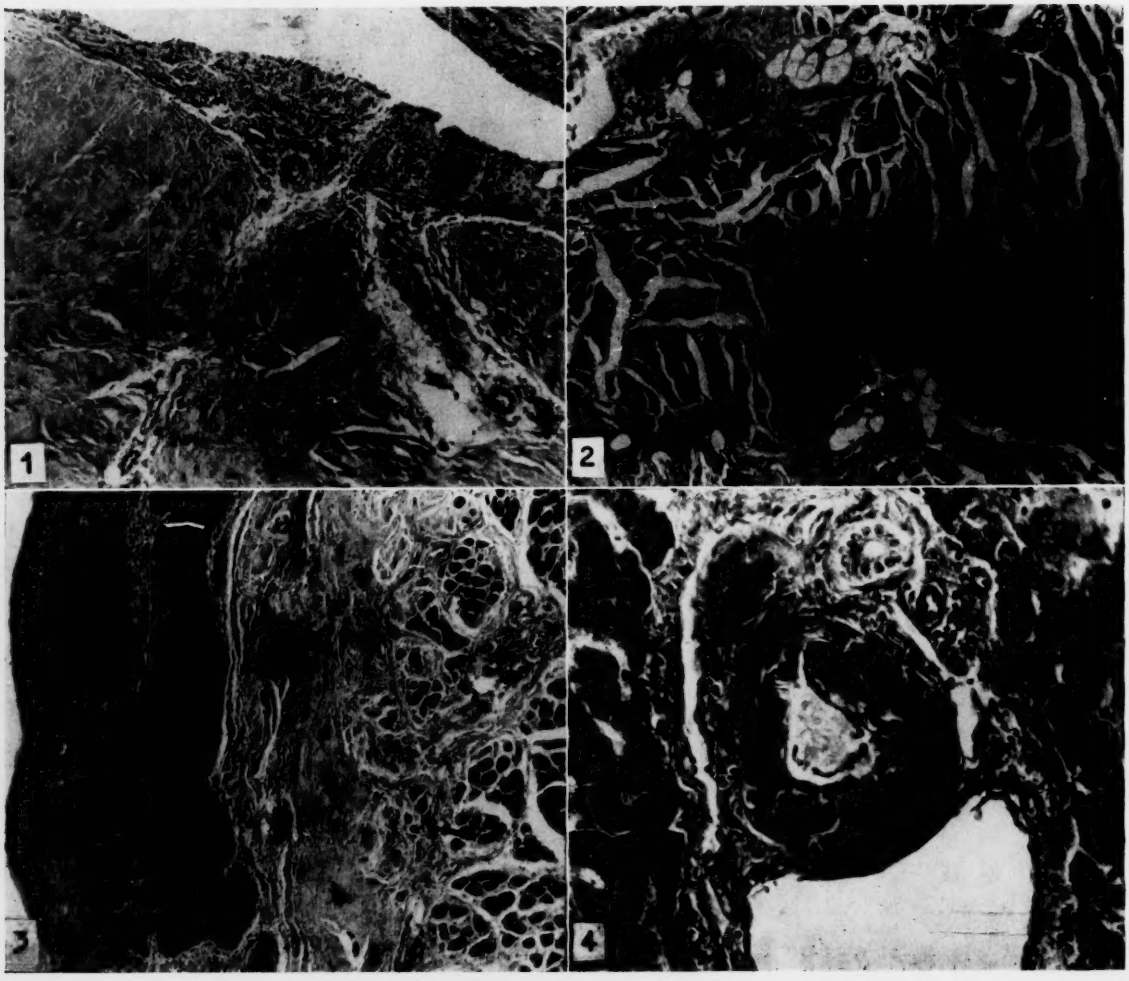

per 1000 licensed motor cyclists *per annum* in New South Wales. Thus the owner of a motor-bicycle from his seventeenth birthday has about a 3% chance of being killed before his twenty-first birthday. This rate is of much the same order of magnitude as that of soldiers of all ages called up for service in the armed forces during the second World War. It is clear that automobile accidents are the major problem at this age. It has given comfort to some observers that the deaths per motor vehicle are less than previously.

Other Road Vehicles.—Deaths due to other road vehicles are of much less importance, and include deaths due to accidents involving pedal bicycles, horse-drawn vehicles and any vehicles other than motor. These death rates have shown some decline.

Water Transport.—It is rather surprising to find that the deaths due to water transport have gone up.

Suicide.—There has been a decline in the suicide rate for females. The male rates are the higher in both periods.

TABLE V.

The Mortality of Young Adults from Violence (i.e. Violent and Accidental Cause) in Australia.

Type of Violence (Sixth Revision of International List).		Deaths per Million *per Annum*.			
		Males.		Females.	
		1931 to 1940	1951 to 1955	1931 to 1940	1951 to 1955
800–2	Railways	30	22	5	2
810–835	Automobiles	377	749	61	98
840–5	Other road vehicles	74	35	9	4
850–8	Water transport	3	15	0	0
860–6	Air transport	12	11	2	2
870–888	Accidental poisonings (solid and liquid)	5	4	4	1
900–4	Accidental falls	41	30	5	4
963, 970–9	Suicide	82	91	37	20
980–5	Homicide	14	12	11	7
912	Machinery	16	11	1	—
914	Electric current	11	16	1	3
916	Fire	15	10	—	7
919	Firearms	53	50	3	3
929	Drownings	104	100	15	7
	Others	101	67	21	5
	Total violent and accidental deaths	937	1227	177	163

Machinery, Electric Current, Fire.—A number of deaths are due to these causes in males. They are probably nearly all occupational.

Drownings.—The drowning rate for males is much higher than for females and is stationary, which is rather surprising. Drownings at this age tend to be associated with swimming in small fresh-water streams and rivers and with boating accidents, other than those involving formal water transport. It is surprising, with the popularity of the surf and the easy modern transport, that the mortality should remain so high. We may note that the deaths from attacks by sharks (see Coppleson, 1950) are not numerically important, although they figure largely in overseas imagination.

The Relative Mode in the Death Rates in Young Adult Life.

If the death rates for any calendar year are plotted against the age on an ordinary arithmetic scale, the curve so formed is concave upwards throughout most of the life span. Van Pesch (1885) noticed that the concavity was absent about the age of 20 years. In more recent years this effect has become exaggerated, so that there is an actual mode in the death rates for males at ages 20 to 24 years. This has been discussed by many writers, including Eijkman (1921), who used Australian statistics among others and found that it was due to tuberculosis. Other authors have found that the mode or tendency to it was due at other times to violence or to mortality associated with child-bearing. Lancaster (1952) examined the Australian experience for 1946 to 1948 and showed that the mode was due to violence. The same holds for the more recent Australian experience in the years 1951 to 1955. Martin (1935) found, too, that violence was the cause of this effect in England, and that there was also a mode in the death rates from tuberculosis.

Discussion.

Sir Heneage Ogilvie (1954, 1956) has described the medical problems of youth in a picturesque manner, and he mentions a new specialty, ephebiatrics, or the study of the ἔφηβος. Such specialism seems rather odd to us, until we consider that the medical care of the soldier or of the student has many special problems. With the decline of the infective diseases generally the special problems of youth are more evident than previously. Injuries due to sport and muscular effort are receiving more attention, and we may mention articles by Critchley (1957) on boxing injuries, and Jokl's (1941) book on the same topic. Schulzinger (1956) has listed many epidemiological features of accidents. Martin (1935) and Lane (1953) have discussed the Australian official statistics from an actuarial point of view. Moore (1928) analysed accidents mentioned in the daily Press for 1926, but little else has been done on this very important topic. The solution of this problem of high mortality in young adult life from violence is, of course, not really medical (since it has occurred despite great advances in treatment), but moral. As Dublin and Lotka (1936) pointed out, what links all the accidental and violent causes together may be said to be a lack of appreciation of the sanctity of human life.

If all causes are taken together and also if single causes are considered, comparisons may be made with England and Wales or with Scotland, in the reports of the respective Registrars-General, or in Logan (1950) and Geary (1952). Peller (1948) has given historical data. We notice that in the latter part of the nineteenth century the rates for Australian males in young adult life were of the same order as in the British Isles, but throughout the first 50 years of this century the Australian rates have been the more favourable. The rates for females have been more favourable in Australia until recently. Since the second World War there has been little difference between the Australian rates and the British, and, indeed, the high accident rates since the war have put the Australian males at a disadvantage.

Summary.

The mortality of young adults in Australia has been analysed. The infections now play only a small part in mortality at this age. There have been rises in the mortality from violent and accidental causes, until in males these causes account for more than 70% of all deaths.

Acknowledgements.

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References.

BURNET, F. M. (1952), "The Pattern of Disease in Childhood", *Australasian Ann. Med.*, 1: 93.

COPPLESON, V. M. (1950), "A Review of Shark Attacks in Australian Waters since 1919", M. J. AUSTRALIA, 2: 680.

CRITCHLEY, M. (1957), "Medical Aspects of Boxing, Particularly from a Neurological Standpoint", *Brit. M. J.*, 1: 357.

CUMPSTON, J. H. L. (1931), "Tuberculosis in Australia", M. J. AUSTRALIA, 2: 153.

CUMPSTON, J. H. L., and MCCALLUM, F. (1927), "The History of the Intestinal Infections (and Typhus Fever) in Australia, 1788-1923", Service Publication No. 36, Department of Health, Commonwealth of Australia, Government Printer, Melbourne.

DUBLIN, L. I., and LOTKA, A. J. (1936), "Length of Life", Ronald Press, New York.

EIJKMAN, C. (1921), "Pulmonary Tuberculosis and the 'Curvature of Van Pesch' ", *J. Hyg.*, 20: 363.

GEARY, R. C. (1952), "Statistical Aspects of Mortality in Early Adult Life", *Brit. M. J.*, 2: 625.

JOKL, E. (1941), "The Medical Aspects of Boxing", van Schaik, Pretoria.

LANCASTER, H. O. (1950), "Tuberculosis Mortality in Australia, 1908 to 1945", M. J. AUSTRALIA, 1: 655.

LANCASTER, H. O. (1952), "The Mortality from Violence in Australia", M. J. AUSTRALIA, 2: 649.

LANCASTER, H. O. (1953), "The Mortality in Australia from Typhus, Typhoid Fever and Infections of the Bowel", M. J. AUSTRALIA, 1: 576.

LANCASTER, H. O. (1954), "Epidemics of Poliomyelitis in New South Wales", M. J. AUSTRALIA, 1: 245.

LANCASTER, H. O., and WILLCOCKS, W. J. (1950), "Mortality in Australia: Population and Mortality Data", M. J. AUSTRALIA, 1: 613.

LANE, G. B. (1953), "Accident Mortality in Australia", *Proc. Actuarial Soc. Australasia*, 8: 135.

LOGAN, W. P. D. (1950), "Mortality in England and Wales from 1848 to 1947", *Population Studies*, 4: 132.

MARTIN, J. M. (1935), "Accidental Deaths and their Effects on Mortality Rates", *Tr. Actuarial Soc. Australasia*, 2: 61.

MARTIN, W. J. (1935), "The Decrease in Mortality during Early Adult Male Life in England and Wales", *J. Hyg.*, 35: 375.

MOORE, K. R. (1928), "Analysis of Accidents Reported in the Melbourne Daily Press during 1926", *Health* (Melbourne), 6: 6.

OGILVIE, H. (1954), "Ephebiatrics", *Lancet*, 2: 395.

OGILVIE, H. (1956), "The Medical Problems of Youth", *Triangle*, (Sandoz), 2: 170.

PELLER, S. (1948), "Mortality, Past and Future", *Population Studies*, 1: 405.

SCHULZINGER, M. S. (1956), "The Accident Syndrome. The Genesis of Accidental Injury: A Clinical Approach", Thomas, Springfield.

VAN PESCH, A. J. (1885), *"Bijdragen van het Statistisch Instituut"*, No. 3, Harlem.

Reports of Cases.

VIOMYCIN AND OXYTETRACYCLINE IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

By A. SALIBA,

Bodington Chest Hospital, Wentworth Falls, N.S.W.

IN recent issues of this Journal some aspects of the chemotherapy of pulmonary tuberculosis have been outlined by P. R. Bull (1957) and by B. Marks (1957). At a time when more patients harbouring strains of bacilli resistant to streptomycin, PAS, and INAH are being found, one has to rely on some alternate combination of drugs both for the purpose of conservative treatment, and as a cover for surgical procedures.

The following cases are submitted, not as a series justifying the use of viomycin *plus* "Terramycin", but as examples of satisfactory results achieved through this combination when other chemotherapy had failed, or when the infection was assumed to be of a resistant type from previous knowledge of the patient concerned. Unfortunately sputum tests for resistance to drugs could not be carried out.

The dosage used in these cases was as follows: viomycin, one gramme twice a day by intramusclar injection twice a week; "Terramycin", three or four grammes in divided doses by mouth daily.

Case I.

A male patient, aged 22 years, in September, 1956, was found to be suffering from extensive bilateral pulmonary tuberculosis, and direct-smear examination of his sputum showed that it persistently contained acid-fast bacilli. Treatment with streptomycin, PAS and INAH was commenced; but after eight weeks on this therapy the sputum findings were still positive, and radiological evidence of deterioration was present. In addition, suppurative inguinal adenitis (proved tuberculous) also developed. At this stage the chemotherapy was changed to the administration of viomycin *plus* "Terramycin" *plus* INAH (300 milligrammes per day). After 12 weeks on this regime there was marked clinical improvement, and much clearing of disease was evident on the X-ray films. Sputum conversion was achieved. This treatment has now been given uninterruptedly for nearly six months and is still continuing. No further positive sputum findings have been obtained, though examination of smears from the inguinal abscess still reveal acid-fast bacilli. Surgical treatment for these glands is being considered.

Case II.

A female patient, aged 30 years, in 1955 was found to have cavitation in the upper lobe of the right lung, and acid-fast bacilli were found in her sputum, on direct-smear examination. After four months' chemotherapy (various combinations of streptomycin, PAS and INAH), the apical segment of the right upper lobe was resected in December, 1955. A broncho-pleural fistula and empyema developed after operation, and resort was then had to partial thoracoplasty and tube drainage. A spread of disease throughout the right lung followed this intervention, and by June, 1956, the sputum still contained acid-fast bacilli. A change of chemotherapy was decided upon, and viomycin *plus* "Terracycin" was given for a three-month period. At the end of this course sputum conversion had been attained, and there was moderate radiological improvement. Healing of the fistula progressed well. However, six months after a change in treatment back to PAS and INAH, a further "positive" specimen of sputum was obtained, though the X-ray improvement has been maintained. The patient is now under clinic observation.

Case III.

A male patient, aged 29 years, in 1949 was found to have active bilateral pulmonary tuberculosis. He was treated with surgery on both sides and much chemotherapy (combinations of streptomycin, PAS and INAH). The disease appeared stabilized, but in January, 1957, he once more presented with a large cavity on the left side, and direct-smear examination of his sputum revealed acid-fast bacilli. Viomycin *plus* "Terramycin" therapy was begun, and after 12 weeks on this treatment cavity closure was obtained and the sputum became free of acid-fast bacilli. The patient is continuing with this treatment under clinic observation; he is well and his sputum is still "negative".

Comment.

Table I shows the results in these patients before and after treatment with viomycin *plus* oxytetracycline.

Two other patients were tried on this combination of drugs. They had chronic, thick-walled cavities which had failed to close after plombage and much previous chemotherapy, and both had sputum persistently found to contain tuberculosis organisms on direct-smear examination. As was expected, no impression was made either on the X-ray appearances or on the positive sputum. However, a trial of viomycin *plus* "Terramycin" was thought justified, as all other measures had failed and major surgery was out of the question. A cavernostomy under local anæsthesia and antibiotic cover has since been performed on these patients.

Discussion.

In Case I, INAH was included with the other two drugs in the hope of a better and a quicker response, because of the patient's serious condition and the extent of the disease. The improvement certainly cannot be attributed to the INAH alone, in view of the initial deterioration during treatment with streptomycin, PAS and INAH. A possible infection with a drug-resistant strain was here considered. Figure I shows representative skiagrams of the progress achieved.

In Case II, no impression was made on the spread of disease throughout the right lung or on the sputum findings until viomycin *plus* "Terramycin" was substituted. A drug resistance must have also been present here, even though streptomycin, PAS and INAH had been given for many months, in the recommended doses and combinations.

TABLE I.

Viomycin with "Terramycin": Results of Treatment.

Case Number.	Before Chemotherapy.					Three Months After Therapy.				
	X-Ray Appearances.	Cavitation.	Sputum.		Known Duration of Illness. (Months.)	X-Ray Improvement.	Sputum.			Patient's General Condition.
			Direct Smear Findings.	Culture Findings.			Volume.	Direct Smear Findings.	Culture Findings.	
I	Far advanced.	Present.	Positive.	Positive.	10	Marked.	Decreased.	Negative.	Negative.	Improved.
II	Moderately advanced.	Not present.	Positive.	Positive.	21	Moderate.	No change.	Negative.	Negative.	Improved.
III	Moderately advanced.	Present.	Positive.	Negative.	96	Marked.	Decreased.	Negative.	Negative.	Improved.

Case III was one of very little natural immunity to the disease. The history unfolded a periodical reactivation of the tuberculous process, and further surgery could not be contemplated for obvious reasons. No good results were foreseen from the repetition of streptomycin, PAS and INAH, because of the recurrence in the face of previous surgery and adequate chemotherapy. It was therefore decided to treat this recent episode with viomycin *plus* "Terramycin".

In the other two cases briefly referred to above, the trial was considered justified even though failure was anticipated. Because of the nature of these cavities, the drugs were not reaching the multiplying organisms in adequate concentration, and as Bull (1957) suggests, the emergence of drug resistance in similar instances is but a question of time.

Toxicity.

Apart from mild episodes of intestinal upset, no ill effects from either drug were noted in the foregoing cases. Edge *et alii* (1957) reviewed 36 thoracic surgical cases in which viomycin was used with any other agent that was considered suitable; no toxic effects were encountered, and only a few patients presented signs of allergy. Because of the toxic effects of the higher doses of viomycin, Phillips *et alii* (1955) state that the recommended dose is rather low and therefore curtails its effectiveness to some extent.

Other Agents.

"Pyrazinamide" and cycloserine are the more recent additions to the chemotherapy of tuberculosis that require mention. "Pyrazinamide" has been proved effective against the tubercle bacillus; but its effect was found to be only of short duration, because of the early emergence of drug resistance. High toxicity with this drug has been experienced. Stewart *et alii* (1957) have suggested that in infections with bacilli resistant to streptomycin, PAS and INAH, a course of viomycin *plus* "Terramycin" may be given as preoperative treatment, and then "Pyrazinamide" may be added as an operation cover, to avoid the risk of drug resistance during the critical period.

Cycloserine has also been reported to possess definite anti-tuberculous activity, but its use is limited because of its high toxicity. Epstein *et alii* (1955) reported good results with cycloserine in the treatment of patients with chronic disease who had failed to respond to previous antimicrobial therapy.

Small series of patients have been treated with "Pyrazinamide" or cycloserine combined with PAS or INAH by the Veterans Administration-Armed Forces of America (1957). Some have reported good results, others only fair. The danger of toxicity with both these drugs limits their value; but even so, there is general agreement concerning the powerful combination of "Pyrazinamide" with INAH, if the possibility of drug resistance at an early stage is borne in mind. Muschenheim *et alii* (1955) tried reduced doses of "Pyrazinamide" with INAH, and yet found some toxicity. In their opinion this reduced dose was also therapeutically inferior.

Conclusion.

In the past many writers have pointed out the definite antituberculous activity of viomycin *plus* oxytetracycline, weak though this may be when compared with streptomycin, PAS or INAH. It is usually agreed that such a combination is justified only when the more powerful drugs cannot be employed for any reason whatsoever. The results in the three cases described above are encouraging, in view of the previous failure of other therapy. Viomycin *plus* "Terramycin" was given for a minimum period of three months, and in Case I for six months, and treatment is continuing. Patients are known to have been treated thus for over nine months, with no notable toxic effects. My own experience with this combination in the United Kingdom was limited, but the results were usually gratifying.

It is certainly a useful combination to bear in mind for selected cases. The power of these drugs could be enhanced by the addition of INAH when the bacilli are susceptible to this, or of "Pyrazinamide" or cycloserine, even if only for special circumstances such as surgical intervention.

Acknowledgements.

My thanks are due to Dr. N. R. Godby, Medical Superintendent of Bodington Chest Hospital, for permission to present these cases.

References.

BULL, P. R. (1957), "Some Thoughts on the Chemotherapy of Tuberculosis", M. J. AUSTRALIA, 1: 721.

EDGE, J. R., KAMIEL, M., SCOTT, N. C., and WEBER, J. C. (1957), "Viomycin as Operative Cover for Major Surgery for Pulmonary Tuberculosis", *Brit. J. Tuberc.*, 51: 168.

EPSTEIN, I. G., NAIR, G. S., and BOYD, L. J. (1955), "Cycloserine, A New Antibiotic, in the Treatment of Human Pulmonary Tuberculosis: A Preliminary Report", *Antibiotic Med.*, 1: 80; abstracted in *Am. Rev. Tuberc.*, July, 1955.

MARKS, B. (1957), "Some Thoughts on the Chemotherapy of Tuberculosis", M. J. AUSTRALIA, 1: 853.

MUSCHENHEIM, C., *et alii* (1955), "Pyrazinamide-Isoniazid in Tuberculosis. Observations with Reduced Dosage of Pyrazinamide", *Am. Rev Tuberc.*, 72: 851.

PHILLIPS, S., and LARKIN, J. C. (1955), "Viomycin in the Retreatment of Pulmonary Tuberculosis", *Am. Rev. Tuberc.*, 72: 843.

STEWART, S. M., MURDOCH, J. M., CROFTON, J. W., and HAY, D. (1957), "Pyrazinamide, Together with Oxytetracycline in Patients with Tubercle Bacilli Resistant to Streptomycin, PAS and Isoniazid", *Brit. J. Tuberc.*, 51: 158.

VAAF OF AMERICA (1957), "Study on the Chemotherapy of Tuberculosis", Quarterly Progress Report, 12: 1.

Legends to Illustrations.

FIGURE I.—Skiagram, October 17, 1956, showing bilateral bronchogenic disease scattered through all lobes.

FIGURE II.—Skiagram, January 16, 1957, showing deterioration in the scattered disease, more marked on the left side, where there is also a pleural effusion to be seen now. This failure to respond was after over eight weeks of treatment with streptomycin, PAS and INAH.

FIGURE III.—Skiagram, June 25, 1957; shows considerable clearing throughout both lung fields after chemotherapy was changed to viomycin, *plus* "Terramycin", *plus* INAH.

PRIMARY SYSTEMIC AMYLOIDOSIS TREATED WITH CORTISONE.

By H. A. COPEMAN, M.R.A.C.P.,
Medical Professional Unit, Brisbane Hospital, Queensland,
AND
N. J. NICOLAIDES, M.R.A.C.P.,
Department of Pathology, Brisbane Hospital, Queensland.

MORE than 100 cases of primary systemic amyloidosis have been reported in the literature since Wild reported his case in 1886. Lubarsch (1929), Koletsky and Stecher (1939), Lindsay and Knorp (1945), Dahlin (1949) and Symmers (1956) have contributed the major series of cases and reviews of the literature. The present case is reported because it appears to be the third case of generalized primary systemic amyloidosis in which the condition was treated with cortisone, and the second case of this disease to be reported from Australia (Cohen, 1953).

Clinical Record.

The patient, a housewife, aged 65 years, was first admitted to the Brisbane Hospital on May 21, 1953, with the history that she had suffered painful stiffness of the knees, wrists and fingers for eight years, and that during the last year she had developed hoarseness of voice, fissuring of the fingernails and loss of hair from the body and scalp. Specific interrogation revealed that for six months she had experienced mild dyspnœa on exertion, that she had had some difficulty in talking and in masticating food because of an increase in the size of her tongue, and that she had noticed dysphagia. Her mother and a brother had died of hypertensive vascular disease, and one brother had had rheumatic fever.

Physical examination revealed her to be a small, white woman in no distress. Her limbs were almost hairless, and the pubic and scalp hair was sparse. Her skin was coarse in texture, and the skeletal muscles and tongue were abnormally firm to palpation. An almost normal range of active skeletal movement was present, although there was moderate generalized muscle weakness with increased resistance to passive movement of all joints. The muscles of the shoulder girdle appeared larger than normal. The blood pressure was 100/70 millimetres of mercury. There was moderate cardiac enlargement, but no evidence of heart failure. Examination of the ocular fundi revealed moderate atherosclerotic changes only. Examination of the blood gave the following information: the hæmoglobin value was 12·9 grammes *per centum*; the white cell count was 5400 per cubic millimetre, 74% being neutrophils, 22% lymphocytes and 4% eosinophils. The total serum protein content was 6·3 grammes *per centum* (copper sulphate method), and paper electrophoresis of the serum proteins showed an alpha-2 globulin fraction of 0·87 gramme *per centum* (see Table I). The urine was free from cells, and gave negative response to tests for albumin and sugar. An electrocardiogram showed low voltage in all leads, with inverted *T* waves in V2 and isoelectric or low upright *T* waves in V4, suggesting myocardial ischæmia. A biopsy taken from the left brachioradialis muscle showed thickening of the vessel walls and replacement of muscle coats with a pale homogeneous material suggestive of amyloid.

With the provisional diagnosis of primary systemic amyloidosis, the patient was discharged from hospital for further observation. She was readmitted to hospital in October, 1954, because of increasing painful stiffness of her legs, ankle œdema and further loss of scalp hair. Her disability was such that she was almost bedridden. Cortisone acetate, 100 milligrammes per day, was given orally, with almost dramatic relief of symptoms, and she was discharged from hospital on a maintenance dose of 37·5 milligrammes per day to continue a much more active life as a housewife. Progress electrocardiograms showed QRS complexes of low voltage, but with less evidence of ischæmia.

She was again admitted to hospital in April, 1955, complaining that, three days previously, while at rest, she had suffered a sudden onset of severe retrosternal pain which persisted for twelve hours and was relieved by morphine. For the first time she felt really ill. Physical examination of the patient revealed a raised jugular venous pressure and moderate respiratory distress, without cyanosis. There was a loud pericardial friction rub, best heard just medial to the apex beat, and a soft mitral systolic murmur was present. An electrocardiogram showed low voltage in all leads, isoelectric or inverted *T* waves in all chest leads, no *Q* waves, and some coving of the *S-T* segments in leads I and II. As cardiac infarction could not be excluded, anticoagulant therapy with "Tromexan" (ethyl biscoumacetate) was commenced, and subsequently digitalis and mercurial diuretics were given for the cardiac failure. Despite two episodes of pneumonia, which responded to penicillin given intramuscularly, she made a good recovery. The pericardial friction rub disappeared in three weeks, and the last vestiges of congestive heart failure in four weeks. Cortisone therapy, in a dosage of 25 milligrammes per day, was continued throughout.

Although she received an average daily dose of less than 150 milligrammes of "Tromexan", her prothrombin level was frequently less than one-fifth normal (control). This necessitated cessation of the drug for up to three days at a time, as subcutaneous hæmorrhages appeared spontaneously.

On discharge from hospital she resumed full activity, but soon needed 75 milligrammes of cortisone per day to maintain this. On this dosage she was able to knit and sew again, her tongue became subjectively smaller, and her voice improved. The mitral systolic murmur persisted, but the electrocardiograms reverted to a pattern similar to that on her first admission.

TABLE I.
Distribution of Serum Proteins by Paper Electrophoresis (in Grammes per Centum).

Date.	Serum Protein.	Albumin. (4·4)[1]	Alpha 1 Globulin. (0·35)	Alpha 2 Globulin. (0·68)	Beta Globulin. (0·84)	Gamma Globulin. (1·00)
May 22, 1953 ..	6·7	3·6	0·41	0·87	0·72	0·90
June 3, 1953 ..	6·3	3·6	0·43	0·87	0·82	0·95
November 3, 1954	6·3	4·0	0·42	0·97	0·92	0·94
June 24, 1955 ..	6·7	3·7	0·40	1·25	0·90	1·18
July 4, 1955 ..	6·5	3·3	0·45	0·90	0·82	0·96

[1] The figures in parentheses represent average figures found with this technique at the Department of Pathology, Brisbane Hospital.

She was finally admitted to hospital on November 17, 1955, complaining of gradually increasing anorexia, dysphagia and occasional dry retching for two weeks. Two days prior to her admission she had begun to vomit and later had a severe hæmatemesis. On her admission to hospital she was shocked, sweating and cyanosed; her blood pressure was 80/50 millimetres of mercury. Resuscitation was attempted, but after further hæmatemeses she died on November 19, 1955, one year and one day since the first use of cortisone.

Autopsy Report.

Macroscopic Findings.

The body was that of a well-nourished female. The skin over the dorsum of both hands was thickened, and there were a number of ecchymoses over the anterior aspects of both legs.

The larger joints (knees, hips, ankles, shoulders and elbows) contained a yellowish, glairy, mucoid material, and the articular cartilages were thickened in some areas. The smaller joints (wrist and small joints of the feet and spine) showed similar but less extensive changes. The muscles felt firmer in consistency than normal and were pale in colour, and many of them showed greyish-white strands running through them.

The tongue was moderately enlarged, its surface was smooth, and in sections its muscle was seen to be very pale in appearance. The soft palate was thickened and somewhat elastic in consistency. The epiglottis was thickened, but the vocal cords and trachea appeared relatively normal.

The heart weighed 300 grammes. The parietal pericardium was thickened, and was firmly attached to the heart anteriorly and posteriorly. Examination of the cut surface of the myocardium did not show any evidence of infarction. The endocardium and valves appeared normal apart from some slight thickening of the mitral valve cusps. In the coronary arteries only a moderate grade of atheroma was present.

In the duodenum there were two fairly large erosions situated at the junction of the first and second parts. The remainder of the gastro-intestinal tract appeared normal, although it contained a moderate amount of blood and blood-stained material.

The other organs, including the brain, liver and spleen, appeared normal on macroscopic examination.

Histological Findings.

On examination of sections, the dermis was infiltrated with a homogeneous material which resembled amyloid on being stained with hæmatoxylin and eosin. There was no significant cellular infiltration. The walls of the small arteries and veins of the dermis were extensively infiltrated with the same type of material. The main sites of deposition or involvement were the medial coats of the vessels. Deposits were also evident around the sweat glands.

Special stains were used to help elucidate the nature of this material, and the staining reactions obtained are set out in Table II. It will be seen that the material stained in a manner similar to that of amyloid from a case of classical amyloidosis secondary to pulmonary tuberculosis.

TABLE II.

Staining Reactions of Amyloid in the Case Described Compared with Amyloid of Classical Secondary Amyloidosis.

Stain.	Reaction in Tissues of the Present Patient.	Reaction in Tissues of a Subject with Amyloidosis Secondary to Tuberculosis.
Hæmatoxylin and eosin	Pink.	Pink.
Van Gieson	Yellow.	Yellow.
Crossman's	Blue.	Blue.
Toluidine blue	Blue.	Blue.
Periodic acid Schiff	Pink.	Pink.
Congo red	Pink.	Red.

It should be noted that the amyloid did not stain typically with Congo red, in that it did not give a red reaction.

On examination of sections of the joints, large amounts of amyloid were found deposited in the synovial and capsular tissues (Figure I). The synovial membrane of the right shoulder joint also showed some chronic inflammatory changes, which were thought to be secondary to the deposition of amyloid.

Examination of the skeletal muscles (*gluteus maximus, rectus abdominis, rectus femoris,* diaphragm and lateral rectus of the eye) revealed amyloid material present in the vessel walls and also infiltrating and replacing much of the muscle tissue itself (Figure II).

Much of the muscle of the tongue was replaced by amyloid (Figure III). The epiglottis was thickened mainly by infiltration of the perichondrium. The muscles and vessels of the vocal cords were also involved.

Examination of sections of cardiac muscle taken from the ventricles showed that although there was infiltration of the coronary arteries and of the pericardium, only a few small areas of muscle were affected by the disease process. However, the auricular muscle was quite extensively involved. Of the heart valves, only the mitral valve was appreciably involved.

Examination of sections taken from the gastro-intestinal tract revealed involvement of the smaller arteries and veins and smooth muscle. Replacement of medial coats of the arteries and veins was most prominent in the palate, whereas involvement of smooth and striated muscle was most prominent in the œsophagus. Examination of sections of the ulcers in the duodenum showed the bowel wall to be necrotic, and very little inflammatory reaction was evident. The muscle and vessels at the site of the ulcers and in surrounding areas of the duodenum were extensively infiltrated with amyloid. The large bowel was also involved, but not severely.

The arteries and veins of the sciatic nerve were extensively involved, and the perineurium was also infiltrated and thickened by deposition of amyloid.

The arteries and veins of the lymph nodes were involved, and in some nodes large areas of amyloid material were present in and around the sinuses, and also involving the surrounding lymphoid tissue.

Adipose tissue from a number of different sites was examined, and depositions of amyloid were often found outlining individual fat cells.

The other viscera, including the liver and spleen, showed similar changes in the walls of their arteries and veins, but the parenchyma of these organs did not appear to be involved (Figure IV).

The nature of the distribution of the amyloid, as well as the absence of an obvious predisposing cause and the fact that the amyloid stained atypically with Congo Red, would suggest that the case was one of primary systemic amyloidosis.

Discussion.

Since Wild (1886) and Lubarsch (1929) described this condition, most of the cases reported have been in people of the 40 to 70 years age group and have been of European origin, although Pearson, Rice and Dickens (1941) and Golden (1945) reported cases in Negroes. Until recently most of these cases had not been diagnosed until autopsy—a fact which is in contrast with the more readily diagnosed secondary amyloidosis (Reece and Reynolds, 1954). In the present case the disease was recognized two and a half years before death by means of skeletal muscle biopsy.

Cases of primary systemic amyloidosis may present with cardiac failure (Lindsay, 1946). Our patient suffered an attack of severe pericarditis clinically resembling coronary occlusion, with subsequent development of congestive heart failure similar to that in Ranstrom's case (1946). However, the electrocardiographic changes were not typical of a myocardial infarction, and autopsy showed no infarct to be present, although there was diffuse pericardial amyloidosis, with amyloid deposition in the blood vessels, mitral valve and left auricular muscle.

Macroglossia and hoarseness seem to be common modes of presentation (Weber, Cade, Stott and Pulvertaft, 1937; Barnard, Smith and Woodhouse, 1938; Baber, 1947). The presenting complaint of our patient was painful stiffness of muscles and joints for many years, with a more recent onset of hoarseness and macroglossia. Examination of joints at autopsy showed infiltration of the periarticular structures and vessels with amyloid. This change has been described by Koletsky and Stecher (1939).

Severe gastro-intestinal hæmorrhage has been described in this condition (Steinhaus, 1902; Golden, 1945). Golden's patient had severe amyloid infiltration of the stomach associated with two prepyloric ulcers. These ulcers involved the *muscularis mucosa*, but did not extend beyond it. The fundus and adjacent tissues were heavily "infiltrated by chronic inflammatory cells". Weber *et alii* quote Steinhaus's case (Steinhaus, 1902), that of a man, aged 40 years, who died after copious intestinal hæmorrhage with involvement of the gastro-intestinal tract with amyloid. Our patient also developed severe gastro-intestinal hæmorrhage, and autopsy disclosed amyloid infiltration and duodenal ulceration. The lack of any inflammation around these ulcers may have been related to cortisone therapy.

The electrophoretic pattern in our case showed an abnormal peak in the alpha-2 area. This abnormality remained unchanged during cortisone therapy (see Table I). Jackson, Rukavina, Block, Falls and Carey in 1955 reported similar abnormal electrophoretic patterns in a number of cases of primary systemic amyloidosis. They also investigated the relatives of these patients, and found evidence to suggest that primary systemic amyloidosis was inherited as a simple Mendelian dominant condition. Many of the normal relatives (*i.e.*, without primary systemic amyloidosis) also showed an abnormal peak in the alpha-2 area. Unfortunately we have not been able to investigate our patient's relatives.

Tiber, Pearlman and Cohen (1941), in an article on hepatic function in patients with secondary amyloidosis, make no mention of the prothrombin time. Our patient showed abnormal sensitivity to anticoagulants of the "Dicoumarin" substitute group—an abnormality which, in view of the lack of hepatic parenchymal involvement, is probably an idiosyncrasy of the patient to this drug.

Cortisone was administered empirically in this case. On this treatment, the patient quickly returned to full domestic duties from an almost bedridden state. Her abnormally firm muscles seemed to become softer and more powerful; her tongue became palpably smaller and more mobile, and her dysphagia decreased. In fact, the patient's last year of life was made very much more comfortable and useful.

Milliken (1955) reported the case of a patient with primary systemic amyloidosis who showed considerable subjective improvement from cortisone therapy over a period of nine months. In another case reported in a clinico-pathological conference from the Barnes and Wohl Hospitals (1954), treatment with cortisone was carried out for approximately one year without any significant improvement.

McCall and Fisher (1953) reported three cases of primary amyloidosis of the larynx; two of the patients were treated with cortisone and one with ACTH. One of those given cortisone showed significant improvement and the other showed no change. The one treated with ACTH was apparently cured. Falbe-Hansen (1955) reported two cases of amyloid disease of the larynx; one patient was given cortisone, with apparently complete remission; the other patient was treated surgically.

Teilum (1952) has shown that cortisone and ACTH accelerate experimentally induced generalized amyloidosis in hyper-immunized animals.

It will thus be seen that no definite conclusions can be drawn from this one case as to the effects of cortisone in the natural course of amyloidosis in man. There was no evidence to suggest that cortisone altered the pathological process to any extent.

Summary.

1. A case of primary systemic amyloidosis is reported.

2. Joint pain and stiffness were the presenting symptoms.

3. Cortisone therapy was given for one year before death supervened.

4. There was both subjective and objective improvement during cortisone administration.

Acknowledgements.

We wish to thank Dr. A. D. D. Pye for permission to quote from the Brisbane Hospital records; Dr. Ellis Murphy, who referred the patient; Professor J. H. Tyrer, into whose beds the patient was admitted; Dr. A. W. Pound, of the pathology department, for his help; and Mr. E. Hollywood, of the photographic department, University of Queensland, who prepared the photomicrographs.

References.

BABER, M. D. (1947), "Amyloid Macroglossia: Report of a Case", *Lancet*, 1: 210.

BARNARD, W. G., SMITH, F. B., and WOODHOUSE, J. L. (1938), "Atypical Amyloidosis with Macroglossia", *J. Path. & Bact.*, 47: 311.

BARNES AND WOHL HOSPITALS (1954), Clinico-Pathological Conference, "Amyloidosis of the Liver and Cardiac Failure", *Am. J. Med.*, 17: 280.

COHEN, A. K. (1953), "Primary Systemic Amyloidosis, with the Report of a Case", M. J. AUSTRALIA, 2: 491.

DAHLIN, D. C. (1948), "Primary Amyloidosis, with Report of Six Cases", *Am. J. Path.*, 25: 105.

DEWOLF, H., and CLARKE, B. E. (1950), "Primary Amyloidosis: Report of a Case", *Am. J. Clin. Path.*, 20: 165.

FALBE-HANSEN, J. (1955), "Amyloid of the Larynx", *Acta oto-laryng.*, 45: 388.

GOLDEN, A. (1945), "Primary Systemic Amyloidosis of the Alimentary Tract", *Arch. Int. Med.*, 75: 413.

JACKSON, C. E., RUKAVINA, J. G., BLOCK, W. D., FALLS, H. F., and CAREY, J. (1955), "Familial Primary Systemic Amyloidosis", *J. Lab. & Clin. Med.*, 46: 925.

KOLETSKY, S., and STECHER, R. M. (1939), "Primary Systemic Amyloidosis Involvement of Cardiac Valves, Joints and Bones, with Pathologic Fracture of the Femur", *Arch. Path.*, 27: 267.

LINDSAY, S. (1946), "The Heart in Primary Systemic Amyloidosis", *Am. Heart J.*, 32: 419.

LINDSAY, S., and KNORP, W. F. (1945), "Primary Systemic Amyloidosis", *Arch. Path.*, 49: 315.

LUBARSCH, O. (1929), "*Zur Kenntnis ungewöhnlicher Amyloidablagerungen*", *Virchows Arch. f. path. Anat.*, 271: 867.

MCCALL, J. W., and FISHER, W. R. (1953), "Primary Amyloidosis of the Larynx with a Report of Experimental Treatment with Cortisone", *Ann. Otol., Rhin. & Laryng.*, 62: 316.

MILLIKEN, J. H. (1955), "Primary Systemic Amyloidosis", *Canad. M. A. J.*, 73: 458.

PEARSON, B., RICE, M. M., and DICKENS, K. La V. (1941), "Primary Systemic Amyloidosis: Report of Two Cases in Negroes, with Special Reference to Certain Histologic Criteria for Diagnosis", *Arch. Path.*, 32: 1.

RANSTROM, S. (1946), "Amyloidosis Myocardii", *Acta med. scandinav.*, 123: 111.

ROBB-SMITH, A. H. T. (1952), Discussion on the collagen vascular diseases, *Proc. Roy. Soc. Med.*, 45: 811.

STEINHAUS, F. (1902), "*Über eine seltene Form von Amyloid und Hyalin-Infiltration am Circulations- und Digestionsapparat*", *Ztschr. f. klin. Med.*, 45: 375.

SYMMERS, W. St C. (1956), "Primary Amyloidosis: A Review", *J. Clin. Path.*, 9: 187.

TEILUM, G. (1952), "Cortisone-Ascorbic Acid Interaction and Pathogenesis of Amyloidosis: Mechanism of Action of Cortisone on Mesenchymal Tissue", *Ann. Rheumat. Dis.*, 11: 119.

TIBER, A. M., PEARLMAN, A. W., and COHEN, S. E. (1941), "Hepatic Function in Patients with Amyloidosis", *Arch. Int. Med.*, 68: 309.

WARREN, S. (1930), "Generalized Amyloidosis of the Muscular Systems", *Am. J. Path.*, 6: 161.

WEBER, F. P., CADE, S., STOTT, A. W., and FULVERTAFT, R. J. V. (1937), "Systematized Atypical Amyloidosis with Macroglossia", *Quart. J. Med.*, 6: 181.

Legends to Illustrations.

FIGURE I.—Photomicrograph showing the capsule from the shoulder joint infiltrated with amyloid. (Hæmatoxylin and eosin, × 75.)

FIGURE II.—Photomicrograph showing the gross amyloid infiltration in a skeletal muscle (*gluteus maximus*). (Hæmatoxylin and eosin, × 75.)

FIGURE III.—Photomicrograph showing amyloid infiltration of the tongue. (Hæmatoxylin and eosin, × 75.)

FIGURE IV.—Photomicrograph showing gross amyloid deposition in an hepatic artery. (Hæmatoxylin and eosin, × 300.)

BILATERAL INTRADUCT CARCINOMA OF THE BREAST.

By JOHN MCCAFFREY,

Mater Misericordiæ Public Hospital, Brisbane.

BILATERAL CARCINOMA of the breast, be it simultaneous or non-simultaneous, has excited the interest of both surgeons and pathologists for many years. In most reports on this subject the incidence is given as between 1% and 8% of all cases of breast carcinoma (Reese, 1953; Pack, 1951). Usually any discussion of this disease is preceded by a review of the lymphatic drainage of the breast, particularly with regard to the inter-breast lymphatic channels. This, and other interesting features of bilateral carcinoma of the breast, are admirably dealt with elsewhere (Hubbard, 1953; Yeates, 1953).

Interest in intraduct carcinoma of the breast was stimulated in 1935 when Muir demonstrated the relationship between it and Paget's disease of the nipple. These observations have been amply confirmed in more recent years (Stapley *et alii*, 1955; Culberson *et alii*, 1956). Stapley *et alii* have also demonstrated the relatively low malignancy of the disease—they claim to have obtained 91·8% five-year cures with Stage I growths treated by radical mastectomy.

Clinical Record.

Mrs. A., aged 70 years, first presented at the surgical out-patient department of the Mater Misericordiæ Hospital on May 15, 1954. Two months previously she had noticed, quite by accident, a lump in her left breast. There was no history of trauma to the breast, of pain in the lump or of rapid growth of the lump. There had been no nipple discharge. The patient had had three children, each of whom she had breast fed for approximately four months. There was no irregularity in the lactational history.

Examination of the patient revealed a hard, irregular mass, which was palpable with the flat of the hand. It was approximately 3·5 by 1·5 centimetres in size, and was situated in the lower and outer quadrant of the breast about one centimetre from the edge of the areola. The mass was attached to the skin, but not to the deep structures. There was no nipple retraction or *peau d'orange*, nor was there any evidence of Paget's disease. There were no palpably enlarged axillary or supraclavicular glands. Abdominal and pelvic examination revealed no abnormality. An X-ray film of the chest appeared normal.

On May 18, simple mastectomy was performed. At operation the tumour appeared as a small, hard mass, 3·0 by 1·0 centimetres in size, embedded in the fat of the breast, with strands of tissue running towards the nipple. There were a few small cystic areas present in the tumour, which appeared, on the whole, rather hæmorrhagic. Dr. G. Taylor, Consultant Pathologist to the hospital, reported on the microscopic appearance of the tumour as follows:

> The tumour resembles a duct papilloma which has become malignant. There is minimal invasion of the periductal tissues.

Subsequent to the operation the patient received deep X-ray therapy to the axillary, internal mammary and supraclavicular gland fields.

The patient remained well up till April 3, 1957, when, while being examined at the follow-up clinic at the out-patient department, she remarked that there had been a little discharge from the nipple of the remaining breast over the preceding three weeks. Examination revealed no abnormality in the breast except an area of induration in the upper outer quadrant of the areola. A little greenish discharge could be expressed from the nipple by gentle pressure over this area. There was no blood in the discharge. Macroscopically the nipple was normal. Full clinical examination of the patient revealed no abnormality apart from mild hypertension. An X-ray film of the chest appeared normal.

On April 5 the indurated area was excised, and the tissue obtained was examined by means of frozen sections. The report on this tissue was "intraduct carcinoma". Simple mastectomy was then performed. Examination of the specimen revealed a small area of firm tissue deep to the areola and on its outer side. A few small cystic areas were present on the cut surface. Close search of the rest of the breast tissue revealed no abnormality. The sections taken from the tumour were reported on by Dr. Taylor as follows:

> The paraffin sections confirm the frozen section diagnosis of intraduct carcinoma. The frozen section showed some infiltration of the periductal tissues which the paraffin sections do not.

The patient made an uninterrupted post-operative recovery, and, after consultation with the visiting radio-therapists, it was decided to give her a course of deep X-ray therapy.

Comment.

The prime purpose in presenting this case is to place on record the description of a case of non-simultaneous intraduct carcinoma of the breast. A close examination of the available surgical literature over the last ten years reveals the description of only one such case (Case 15 of Reese's series, 1953).

I think that this case is genuinely one of breast carcinoma of multifocal origin, and not merely one tumour with metastatic deposits in the other breast. However, I can offer no evidence in support of this view except the long period which elapsed before the appearance of the second tumour. If it is in fact a metastatic deposit, then this case lends weight to the argument in favour of bilateral mastectomy as the treatment of choice in carcinoma of the breast (Pack, 1951; Hubbard, 1953). Aird (1957) considers that this mode of therapy might improve survival figures, but adopts a conservative attitude towards it. I think that most Australian surgeons would agree with his view.

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References.

AIRD, I. (1957), "A Companion in Surgical Studies", Second Edition, Livingstone, 630.

CULBERSON, J. D., and HORN, R. C. (1956), "Paget's Disease of the Nipple", *Arch. Surg.*, 72: 224.

HUBBARD, T. B. (1953), "Non-Simultaneous Bilateral Carcinoma of the Breast", *Surgery*, 34: 706.

PACK, G. I. (1951), "Argument for Bilateral Mastectomy", *Surgery*, 29: 929.

MUIR, R. (1935), "The Pathogenesis of Paget's Disease of the Nipple and Associated Lesions", *Brit. J. Surg.*, 22: 728.

REESE, A. J. M. (1953), "Bilateral Carcinoma of the Breast", *Brit. J. Surg.*, 40: 428.

STAPLEY, L. A., DOCKERTY, M. B., and HARRINGTON, S. W. (1955), "Comedo-Carcinoma of the Breast", *Surg., Gynec. & Obst.*, 100: 707.

YEATES, J. M. (1953), "Bilateral Carcinoma of the Breast", M. J. AUSTRALIA, 2: 54.

Reviews.

Medical Ethics: A Guide to Students and Practitioners. Edited by Maurice Davidson, M.A., D.M., B.Ch. (Oxon.), F.R.C.P. (Lond.); 1957. London: Lloyd-Luke (Medical Books), Limited. 8½" × 5½", pp. 176. Price: 20s. (English).

THIS is an admirable collection of papers by a distinguished group of authors, brought together under the editorship of Maurice Davidson, who is Consulting Physician to the Brompton Hospital and to the Miller General Hospital for South-East London. The tone of the book is set by the frontispiece, which is a reproduction of Haywood Hardy's well-known etching, "The Country Doctor". The editor's introduction is followed by 13 separate papers, some of which have been previously published elsewhere; though each is complete in itself, they make up a satisfying whole and can with advantage be listed. The structure and functions of the General Medical Council are set out by the Registrar of the Council, W. K. Pyke-Lees. This is followed by papers on "Professional Ethics" by Hugh A. Clegg, Editor of the *British Medical Journal*, on "The Doctor-Patient Relationship" by Lord Cohen, on "The Doctor's Relationship to His Professional Colleagues" by Sir Heneage Ogilvie, on "Medicine and the Church" by the Lord Bishop of Durham, on "The Doctor, the Law and the Police" by H. Neville Stafford, who is a barrister-at-law and a former coroner as well as a medical practitioner, on "The Doctor's Responsibility to His Family" by Maurice Davidson, who also discusses "What to Tell the Gravely Ill Patient or One who has to Undergo a Serious Operation", on "Contraception, Therapeutic Abortion, Sterilization, and Artificial Insemination" by F. W. Roques, Obstetric and Gynæcological Surgeon to the Middlesex Hospital, on "The Management of the Hopeless Case" by Lindsey W. Batten, on "The Care of the Dying" by J. Clifford Hoyle, on "The Practice of Experimental Medicine" by R. A. McCance, Professor of Experimental Medicine in the University of Cambridge, and on "The Hippocratic Oath" by Douglas J. Guthrie. The articles are a little uneven in quality, but the value of the book as a whole is very high. We wish that there was some way of making all doctors read it and digest it. Certain sections of it are referred to in more detail in the leading article in this issue.

Blood Pressure Sounds and Their Meanings. By John Erskine Malcolm, B.Sc., M.B., Ch.B., F.R.C.S.; 1957. London: William Heinemann (Medical Books), Limited. 7¼" × 4¾", pp. 104, with 45 illustrations. Price: 12s. 6d.

THIS small book is an attempt to explain the causation of the Korotkov's sounds produced when estimating the blood pressure by an inflatable cuff. Mathematical analysis of oscillometric curves is attempted, and the relation of Korotkov's sounds to oscillometric patterns is discussed. The book will be of interest to those working in the field of cardio-vascular dynamics, but is not of value to the practising physician unless he is well grounded in mathematics and physics.

An Introduction to Blood Group Serology: Theory, Techniques, Practical Applications, Apparatus. By Kathleen E. Boorman and Barbara E. Dodd, M.Sc. (Lond.), Ph.D. (Lond.); 1957. London: J. and A. Churchill, Limited. 8¾" × 5½", pp. 328, with 30 illustrations. Price: 40s. (English).

THE authors of this book have been working for several years in the South London Blood Transfusion Centre, where they have employed most of the available techniques in blood group serology. They have now described these techniques in detail and have discussed the merits of each. Their aim has been to introduce the beginner to the field and to provide him with details of every technique that he may require in hospital or reference laboratory. The book is therefore both an introduction to the subject and a reference book "suitable for all engaged in routine blood group serology, whether in the large transfusion centres, in specialized or in general pathological laboratories". To further its dual purpose the authors have selected from the contents a "shortened version", which they suggest is sufficient for the worker not specializing in the field.

A total of 102 techniques are described in the course of six sections. The first section is an introduction to the human blood groups; the next three are concerned with the A B O, Rh and other blood group systems of antigens and antibodies; the fifth section of 100 pages describes the techniques employed in the application of these blood groups. This section covers the questions of the selection of blood

for transfusions, direct matching tests, incompatible transfusion reactions, hæmolytic disease of the newborn, hæmolytic anæmias, the use of blood groups in doubtful paternity, human genetics and anthropology, and the collection and testing of blood and blood products. A final section provides a lucid and helpful discussion of apparatus and reagents. Three appendices provide a guide to laboratory procedures in blood group work, a glossary and a numerical index of techniques.

The book has been carefully prepared and is well illustrated and produced. Without doubt it covers the field adequately and must find a place in every large hæmatological laboratory as a reference book. It is, however, less suitable for the laboratory worker who undertakes only blood grouping, Rh testing and cross-matching prior to transfusion, and who prefers to consult a reference laboratory for more detailed investigations.

Blood and Bone Marrow Patterns. By G. D. Talbott, M.D. Elmer R. Hunsicker, B.S., and Jonah Li, M.D.; 1957. New York and London: Grune and Stratton. 12″ × 9″, pp. 60, with many illustrations. Price: $12.00.

THIS beautifully produced atlas of hæmatology consists of coloured photomicrographs of blood and bone-marrow, five or six to a page, with very brief descriptions. The authors state that it was their "intent and design" to emphasize blood-cell patterns rather than cell morphology. However, as they hope that the atlas will be of particular value to the non-specialist practitioner, the student and the technologist, the first part of the book is devoted to the identification of individual cells. In describing the red-cell series, the "Rubriblast" terminology, proposed in 1949,[1] is used; this terminology has not been generally adopted, and its use is somewhat confusing. The coloured photomicrographs, with a few exceptions, are excellent; but the descriptions accompanying them are very brief, and indeed quite inadequate. An atlas such as this could be very misleading to the inexperienced and should be used only in conjunction with an authoritative text-book of hæmatology.

Peripheral Circulation in Health and Disease. By Walter Redisch, M.D., F.A.C.P., and Francisco F. Tangco, M.D., B.S., with a special section by R. L. deC. H. Saunders, M.D., F.R.S.E.; 1957. New York: Grune and Stratton. 10″ × 7″, pp. 160, with 25 illustrations. Price: $7.75.

OF recent years, several large and excellent books on peripheral vascular disease have been published, but because of their size and the fact that they often deal with diseases rather than clinical problems, these books are apt to be forbidding to the physician not specializing in vascular diseases. There is, therefore, a place for a small book dealing with peripheral vascular diseases from a clinical aspect, and presenting a concise picture readily assimilated not only by the specialist, but also by the general medical reader. The hope was raised that this would be such a book, particularly as it is stated by the writer of the preface that the book would be useful for medical students, for workers directly concerned with the field and for practitioners of general medicine.

This book deals with peripheral vascular disease from a broad aspect. It has chapters with sections on "basic aspects of peripheral blood flow", "pathologic alterations in peripheral blood flow", "physiologic responses to disturbances in blood flow" and "management and therapy", and departs from the more conventional method of dealing with pathology, clinical features and treatment of each particular disease in turn. Rather incongruously, the book terminates with a section on the "anatomic basis of the peripheral circulation in man".

Unfortunately the book is likely to prove disappointing to the three groups for whom it is supposedly written. It is too brief for the specialist, it is insufficiently interesting and lacks the sense of balance necessary for a students' text-book, and the section on treatment does not give the practical detail required by general practitioners. The final section (by Dr. Saunders and associates) on the "anatomic basis of the peripheral circulation" is the most interesting part. It stresses the inadequacy of the conventional idea of the circulatory system as a vascular tree with successively smaller branches, and shows that it can be better regarded as a continuous network of channels ("macromesh" and "micromesh"). However, this section, excellent in itself, seems out of keeping with the remainder of the book.

[1] Committee for Clarification of the Nomenclature of Cells and Diseases of the Blood and Blood-Forming Organs (1949), Second Report, *Am. J. Clin. Path.*, 19 : 56.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"The Hemodynamics of the Lesser Circulation in Pulmonary Tuberculosis: Effect of Exercise, Temporary Unilateral Pulmonary Artery Occlusion, and Operation", by Bror Söderholm; 1957. Oslo: *The Scandinavian Journal of Clinical and Laboratory Investigation*, Volume 9, Supplement 26. 9¼″ × 6½″, pp. 112, with 13 illustrations. No price stated.

The outcome of routine examinations during the period from 1954 to 1956.

"Influence of Posture on the Lung Volumes, Ventilation and Circulation in Normals: A Spirometric-Bronchospirometric Investigation", by Lawe Svanberg; 1957. Oslo: *The Scandinavian Journal of Clinical and Laboratory Investigation*, Volume 9, Supplement 25. 9¼″ × 6½″, pp. 196, wtih many illustrations. No price stated.

The title is self-explanatory.

"Intermediate Reactions in the Coagulation of Blood with Tissue Thromboplastin: Convertin, Accelerin, Prothrombinase", by Peter F. Hjort; 1957. Oslo: Oslo University Press; *The Scandinavian Journal of Clinical and Laboratory Investigation*, Volume 9, Supplement 27. 9¼″ × 6⅜″, pp. 184, with 64 illustrations. No price stated.

Investigations carried out over a two-year period in the Coagulation Laboratory, Medical Department A, University Hospital of Oslo.

"The Student Life: The Philosophy of Sir William Osler", edited by Richard E. Verney, M.B., F.R.C.P.E., D.R., with forewords by John Bruce, C.B.E., T.D., M.B., Ch.B., F.R.C.S.Ed., and Alec H. Macklin, O.B.E., M.C., T.D., M.D.; 1957. Edinburgh and London: E. and S. Livingstone, Limited. 7¼″ × 5″, pp. 228. Price: 15s. (English).

Medical philosophy by a great doctor.

"Mental Deficiency", by L. T. Hilliard, M.A., M.B., D.P.M., and Brian H. Kirman, M.D., D.P.M.; 1957. London: J. and A. Churchill, Limited. 9¼″ × 6″, pp. 536, with 90 illustrations. Price: 60s. (English).

Written for medical practitioners, social workers, psychologists, educationalists and others, in the light of modern trends.

"Sir George Buckston Browne", by Jessie Dobson, B.A., M.Sc., and Sir Cecil Wakeley, Bt., K.B.E., C.B., LL.D., D.Sc., F.R.C.S., F.R.A.C.S., F.A.C.S., with a foreword by Emeritus Professor Sir Harry Platt, LL.D., M.D., M.S., F.R.C.S., F.A.C.S.; 1957. Edinburgh and London: E. and S. Livingstone, Limited. 8¾″ × 6¼″, pp. 152, with 28 illustrations. Price: 25s. (English).

The story of a distinguished English surgeon.

"Gastro-Intestinal Obstruction", by Meyer O. Cantor, M.D., M.S., F.A.C.S., and Roland P. Reynolds, M.D., F.A.C.S.; 1957. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10¼″ × 7½″, pp. 580, with 415 illustrations. Price: £9 18s.

The authors are surgeons, but they have aimed to include all the available knowledge on the subject.

"A Theory of Disease", by Arthur Guirdham, M.A., B.Sc. (Oxon.), D.P.M.; 1957. London: George Allen and Unwin, Limited. 8½″ × 5½″, pp. 204. Price: 21s. (English).

The author aims to produce a comprehensive theory of disease on a philosophic basis.

"Soldier Surgeon in Malaya", by Thomas Hamilton, Lieutenant-Colonel, E.D., R.A.A.M.C. (ret.); 1957. Sydney, London, Melbourne, Wellington: Angus and Robertson, Limited. 8½″ × 5½″, pp. 224, with illustrations. Price: 18s. 6d.

The story of the work of the 2/4th Casualty Clearing Station of the 8th Division (A.I.F.) in Malaya and Singapore in 1941-1942.

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COMPETENCE AND HONOUR.

"FROM the time of Hippocrates on, medical men, acting corporatively, have been at pains to do two things: to admit to their ranks only those who have passed strict tests of competence, and to subject them to a strict code of professional and personal conduct." So writes Hugh Clegg in a recent important book on medical ethics.[1] The book, which warrants the attention of every practitioner of medicine, is reviewed elsewhere in this issue. It offers stimulating thoughts from a distinguished team of contributors on many of the problems and demands inseparable from medical practice. For the moment we are concerned with Clegg's chapter on professional ethics. In elaborating the statement that we have already quoted he adds: "Medical men through the ages have been insistent that . . . the competent should be honourable . . .", and so sums up in five words the basis of medical ethics.

The distinction between medical ethics and etiquette is not always easily drawn—there is a good deal of overlap; yet it is important to recognize that the distinction exists. A commonly accepted statement of the position is that given by C. A. Clarke:[2]

> Etiquette governs the conduct of doctors one with another, whilst ethics deals with their relationships towards individual members of the public and also their responsibility to the State.

The objection to this statement is that, applied in detail, it cuts across what is understood by etiquette and ethics in a wider context. This is a pity, as there will be fairly general agreement with the basic belief expressed by the Council on Constitution and By-laws of the American Medical Association[3] in its draft of a new, much abbreviated code—namely, "that medical ethics are not distinct and separate from ethics generally, but simply emphasize those principles which are of particular concern to the medical profession". Most people will have some idea of what is meant by etiquette, even if they are irritated by it or scorn it completely. They are more likely to be hazy about the meaning of ethics, while accepting that it is something important. The whole subject is discussed usefully by Clegg, who has consulted Hippocrates, Aristotle and the thirteenth edition of the "Encyclopædia Britannica" on the matter. It seems enough here to echo the thought that ethics are the reflection of the ancient ideals of medicine—"Medicine a calling, a vocation, a way of life linked in its distant past with religious life"; and that etiquette is "a modifier of behaviour". Clegg then comments: "By preserving the forms it [etiquette] helps to preserve the substance [ethics]. The danger is that the forms may be held to be the substance."

Further discussion on medical etiquette may well wait for another occasion; but it is worth while to think more about the implications of professional ethics, as summed up in the combination of competence and honour. Francis Bacon in one of his essays expressed much the same idea, holding "every man a debtor to his profession", to which he should endeavour to be "a help and ornament". He then went on: "This is performed in some degree by the honest and liberal practice of the profession; where men shall carry a respect not to descend into any course that is corrupt and unworthy thereof, and preserve themselves free from the abuses wherewith the same profession is noted to be infected; but much more is this performed, if a man be able to visit and strengthen the roots and foundation of the science itself; thereby not only gracing it in reputation and dignity, but also amplifying it in profession and substance." Bacon accepted this standard of competence and honour for all professional men three and a half centuries ago. The need for its maintenance cannot be said to have diminished in our own day, with its greater complexity and pace of living, or for our own profession, which deals as closely as any, and more closely than most, with human life, welfare and dignity.

The General Medical Council in Great Britain and the Medical Boards in Australia are the bodies with the statutory power for upholding the ethical standards of medicine. However, much of the responsibility for maintaining these standards, especially in this country, is in the hands of the British Medical Association, which extends the scope of ethical requirements, overlapping them into the field of medical etiquette. It should be noted that the General Medical Council has exceptional powers and responsibilities, which are set out in a readable fashion in a separate chapter of this book on medical ethics by W. K. Pyke-Lees, the Registrar of the Council. Not only does it enforce what the law regards as right and proper for professional behaviour and determine the standards of professional competence required of those who would be registered in terms of recognized degrees and diplomas, but it periodically issues to licensing bodies—that is, universities and other bodies conferring registrable qualifications—recommendations as to the minimum courses of study and examinations which ought to be required of medical students. The bodies responsible for medical registration in Australia are not concerned with recommending the curriculum of medical students, but are naturally influenced strongly by the registration requirements of the General Medical Council. It is important to maintain reciprocity of registration between Australia and Great Britain. For a similar reason, the medical schools in Australia take much notice of the recommendations of the General Medical Council, and it is pleasing to know that the recommendations recently put out by

[1] "Medical Ethics: A Guide to Students and Practitioners", edited by Maurice Davidson, M.A., D.M., B.Ch. (Oxon.), F.R.C.P. (Lond.); 1957. London: Lloyd-Luke (Medical Books), Limited. 8¼" × 5¼", pp. 176. Price: 20s. (English).
[2] *Practitioner*, 1957, 179: 5 (July).
[3] *J.A.M.A.*, 1956, 162: 505 (September 29).

the Council are particularly broad and flexible, giving great scope to those who are anxious to keep medical education from getting into a rut. The chapter in this book on the General Medical Council is a most reasonable and human document. It would be particularly good if it could be put into the hands, not so much of the section of the medical profession which is prepared to conform to statutory and other conventional requirements, but of the other not inconsiderable group which is not so happy to conform, and bridles at the very thought of bureaucratic control. The pettier forms of bureaucracy do emerge occasionally in the activities of such bodies as Medical Boards, and no doubt the General Medical Council has at times been concerned with the same thing. However, this is usually the result of the influence of an individual, and a fair reading of what Pyke-Lees has to say will show that the maintenance of a right measure of competence and honour amongst medical practitioners is the whole basis of what such bodies have to administer, and must be accepted, most of the time at least, as the activating motive of those in authority.

The practice of medicine today is undergoing revolutionary changes. Two major elements influencing and even directing these changes are the rapid development of scientific knowledge and the evolution of the pattern of society. The first of these brings the danger of over-emphasis on and preoccupation with purely objective scientific findings and the results of laboratory investigations. The second lays increasing stress on the group and the community rather than the individual and threatens bureaucratic intrusion at every point of daily living. In both cases the person can easily be lost sight of. At the same time these changes are occurring and in some degree are inevitable. The only realistic approach is to learn to live with them and to help to keep them under control. All scientific development is not necessarily progress in a favourable sense, but no one can seriously lament the growing scientific basis of medicine, provided that a man, woman or child is not equated with the sum total of the data obtained from exhaustive laboratory investigation. The sharing by the community of the heavier burdens of the individual is desirable, and in our large complex modern communities is inseparable from some form of organization and perhaps some degree of restriction of personal liberty; but the rot has set in when the individual is in danger of succumbing in favour of the State, either crushed by totalitarianism or drowned in a flood of "welfare". Changes occur swiftly in our day, and many communities have woken in the morning to find that their human rights have disappeared in the night. Human rights and human values are precious things, and doctors have had peculiar opportunities of appreciating and defending them. Those opportunities will not continue unless the medical profession retains and fosters its integrity in both organization and conduct—the physical integrity of a united profession and the scientific and moral integrity of a profession that demands of its members competence and honour. It is fair enough to say that modern life has altered the way in which we must look at some aspects of medical ethics; but we might well consider whether what is needed is not so much restatement as reinstatement.

Current Comment.

VITAMIN-SPARING ACTION OF SORBITOL.

IT has long been known that thiamine is necessary for the complete metabolism of carbohydrates in the animal body. The products of the deranged sugar metabolism act as poisons, and, in a way, we might look upon dietary carbohydrate as a toxic substance the antidote for which is thiamine. T. B. Morgan and J. Yudkin[1] have shown that in the complete absence of carbohydrates in the food rats are able to survive for many months without any thiamine in the diet. If 5% or 10% of glucose is given, the rats die quickly from thiamine deficiency. It is not known how sorbitol, a sugar alcohol, is metabolized in the body, whether as a carbohydrate or in some other way. Sorbitol has been used to replace sugar in the diet of diabetics. It was thought that giving sorbitol to rats deprived of carbohydrates and thiamine in the diet might show how sorbitol was metabolized. Actually sorbitol had a remarkable effect on the synthesis of *B* vitamins by intestinal bacteria. When sorbitol at levels up to 20% was given to rats on a diet free from carbohydrates and thiamine, they survived for over 30 weeks and were still gaining weight. When added to diets containing up to 40% of glucose, 10% of sorbitol gave good growth with no thiamine in the diet. Evidence showed that the effect was on the synthesis of thiamine by the intestinal bacteria. When all, or nearly all, the *B* vitamins were omitted from the diet, but 20% of sorbitol was given, rats consuming the diet were still gaining weight rapidly after three months. Rats losing weight on a thiamine-free diet rapidly gained weight when given sorbitol, which shows that the change-over in the intestinal microflora is rapid.

Thus the administration of sorbitol seems to be able to take the place of all the *B* vitamins in the diet, in the rat at any rate. It is not known whether sorbitol will have these effects in man, but doses of 30 to 80 grammes have been given to diabetics to replace sugar in the diet without raising the blood sugar level; so the substance is evidently not toxic at these doses. Larger doses can cause severe diarrhœa, as they do in rats.

EXHIBITION OF MEDALLIONS OF MEDICO-HISTORICAL INTEREST.

THE Medical History Museum of the Medical Society of Victoria has begun a series of small exhibitions with a collection of medallions of medico-historical interest derived from the Museum's holdings, supplemented by loans from Professor K. F. Russell and Dr. Bryan Gandevia.

The first four items on display were used as tokens of membership of French medical societies in the late eighteenth and early nineteenth centuries; the reverse sides carry representations of Æsculapius, Hippocrates, Claudius Galen and Xavier Bichat. Jetons of two of the Deans of the old Faculty of Medicine in Paris are shown. The first, of H. J. T. Baron (1730-1734), carries on the reverse a scene commemorating the recent completion of the *Codex Pharmacopearum* (1732), while the second, of Jean-Baptiste Louis Chomel (1754-1756), author of a history of medicine in France, has on the reverse the three storks of the Arms of the Faculty. A related item dated 1691 shows the Anatomical Theatre of St. Côme recently built by the surgeons of Paris. Completing the section on tokens, a penny and a halfpenny, dated 1858, are displayed; these were issued as advertisement by "Professor" Holloway, a noted purveyor of pills and ointments.

A series of medallions commemorate the names of famous doctors and scientists: Louis Pasteur (silver

[1] *Nature*, 1957, 180: 543 (September 14).

medallion of 1888 and the bronze plaquette of later date), Albert Calmette, Jules Bordet, Ernest Besnier, R. T. H. Laennec, Jacques Necker, P. C. Potain, J. M. Charcot, Paul Spillmann, J. D. Larrey, Benjamin Brodie, Ramon y Cajal, Pierre Curie, G. L. C. F. D. Cuvier, D. L. F. Panckoucke, B. Labey, R. Koehler, E. Maupas. Both the portraits on the obverse and the scenes frequently found on the reverse sides are beautifully executed and of great artistic merit.

The final group of medallions relates to *l'Assistance publique, l'École d'application du service de santé militaire*, 1850-1950 (the obverse shows a view of the *Hôpital du Val de Grâce*, while the reverse carries a beautiful representation of the famous painting on a Greek vase, representing Achilles bandaging the injured arm of Patroclus), the Company of Surgeons (the anatomy medal of 1767, first described by Professor Russell), the International Medical Congress, London, 1881, and Rome, 1894, and finally the British Red Cross replica of the medallion issued by the Germans to commemorate the sinking of the *Lusitania*.

The display will be on view for approximately one month.

ST. VINCENT'S HOSPITAL, SYDNEY, ANTI-CANCER APPEAL.

A COBALT-60 supervoltage beam machine costing over £40,000 is being presented to St. Vincent's Hospital, Sydney, by the Cobalt Beam Cancer Treatment Fund, and is scheduled to arrive in Sydney early in 1958. Funds are urgently needed now to install and house it, to provide additional equipment and to organize the work it will involve. This is part of a large project to provide a worthwhile service for the diagnosis and treatment of cancer at St. Vincent's Hospital. To this end an appeal is being made for £50,000 to develop the Tumour Clinics, Radiotherapy Department and Physics Department at the hospital.

It would be superfluous in a journal such as this to expound the importance of an appeal of this character. It should be sufficient to mention it to elicit a sympathetic response. Donations, which are deductions for income tax purposes, may be sent to the Honorary Treasurer, "St. Vincent's Anti-Cancer Appeal", Room 125, 66 Pitt Street, Sydney (telephone: BL 5898).

TREATMENT OF RHEUMATIC FEVER.

"A PERUSAL of the literature which bears on the question of the treatment of acute rheumatism is a task from which few would rise with any definite idea of how the disease is best managed. . . ." This sentence served to introduce Maclagan's article entitled "The Treatment of Acute Rheumatism with Salicin", which appeared in *The Lancet* of March 4, 1876. It is still an appropriate commentary on the therapeutic position today. Despite a number of attempts to assess the respective roles of salicylate and steroid therapy, there is still no common agreement.

R. S. Illingworth[1] and his colleagues in Sheffield have recently published a report comparing the results of six forms of treatment in 200 rheumatic children, and summarizing experience gained over the past nine years. The six groups studied received one of the following: no specific drug, salicylate in low dosage, salicylate in high dosage, steroid therapy alone, steroid with salicylate in low dosage, or steroid with salicylate in high dosage. The principal conclusions were: (i) that steroid combined with salicylate in high dosage caused a more rapid fall of the erythrocyte sedimentation rate than any of the other treatments; (ii) that the duration of arthritis was less in the steroid-treated group; (iii) that new rheumatic manifestations (nodules, heart failure, pericarditis, chorea and arthritis) did not develop during treatment in the steroid-treated group; (iv) that the steroid-treated group fared better with respect to carditis; (v) that fever disappeared more rapidly in the steroid-treated group. It was then concluded that steroid therapy combined with high dosage of salicylate was "more effective than any of the other treatments given, including cortisone alone, but that cortisone alone was superior to salicylate alone".

In the Anglo-American Cooperative Trial of 1955, involving 497 patients, it was found that soft apical systolic murmurs disappeared more rapidly in the hormone-treated groups than in the salicylate group, but that there was no significant difference in cardiac status at the end of one year. Illingworth's findings in his smaller survey suggest that significantly more children in the steroid-treated groups lost all evidence of carditis provided treatment was commenced within thirty days of onset of the disease. The need for early treatment has been suggested by previous writers. A possible criticism of both the Anglo-American and Illingworth reports is that the dosage of steroid used is considerably lower than that employed in many centres today. Due consideration needs to be given to this important point in assessing the value of both these surveys. Much more work needs to be done using steroid therapy in higher dosage for longer periods, with or without salicylate, before it can be assumed that combined steroid and salicylate treatment offers the best remedy for the rheumatic child. Indeed, with a disease of this nature it is obviously necessary to conduct studies over a large number of years before a reliable statement can be made on the all-important effect of any form of therapy on ultimate cardiac status.

[1] *Lancet*, 1957, 2: 653 (October 5).

THE USE OF THE INTESTINE IN UROLOGY.

THE importance and the limitations of the use of the intestine in urology are well brought out in a paper read at the annual meeting of the British Association of Urological Surgeons by C. A. Wells.[1] Wells has presented a study of ileal ureterostomy in particular and also of ureteric replacement by ileum and of ileocystoplasty where a contracted bladder has to be enlarged. For the present we will limit ourselves to the study of ileal ureterostomy, in which an isolated segment of ileum is used as a conduit to lead urine to the surface, where it is collected in a rubber bag. The conclusions reached are based on a study of answers to a *questionnaire* sent by Wells to members of the British Association of Urological Surgeons. The survey of ileal ureterostomy is based on records of 212 patients treated in this fashion. Of the indications, carcinoma of the bladder was the most frequent, but the operation was successfully employed for congenital abnormalities, especially in children. Wells states that there had been uneasiness about the results of ureterocolic anastomosis long before the survey of Jacobs and Stirling in 1952. Their findings brought these fears into focus, and it is clear that trouble may arise through three mechanisms: (i) stenosis, (ii) reflux, (iii) acidosis. None of these, however, appears to be insuperable. The advantage of using an isolated loop of ileum as a conduit to the exterior is that hardly any urinary constituents are reabsorbed, and therefore the blood chemistry remains unchanged. Stenosis is avoided by using the Reed Nesbit wide method of anastomosis. Even if reflux occurs, it is gratifying to note that the incidence of pyelonephritis is very low. There are, however, less rosy aspects of ileal ureterostomy. The first is the need to wear a bag, which is repellent to some patients. Wells describes an excellent apparatus made in Liverpool, England, by a MR. Bullen: a flange is glued to the skin, and a detachable "Latex" bag is connected to it. The second problem is that of morbidity and mortality. Mortality is unfortunately far too high, the overall risk being about 25%. The deaths have usually arisen out of various complications, the worst being ileus. Wells thinks that he will conquer this risk in future by using prophylactically, as a routine, an indwelling jejunal tube; in his last five cases ileus has not occurred.

[1] *Brit. J. Urol.*, 1956, 28: 335 (December).

Abstracts from Medical Literature.

RADIOLOGY.

The Variable Appearance of Constrictive Pericarditis.

R. HEINZ AND H. L. ABRAMS (*Radiology*, July, 1957) demonstrate that there is no "characteristic" radiological picture in the analysis of the X-ray findings in constrictive pericarditis. In spite of frequent descriptions of a "small heart", the cardiac silhouette may appear enlarged in many cases, and normal pulsation may be noted fluoroscopically and kymographically. Although pericardial calcification was demonstrated in only about half of the cases reported here, its presence is helpful when constrictive pericarditis is suspected. Commonly, the right ventricle, the pulmonary artery segment and the hilar pulmonary arteries are enlarged, and pulmonary engorgement is apparent. If constrictive pericarditis is indicated clinically, such observations as cardiac enlargement, cardiac pulsations within the normal range, and radiological evidence of pulmonary artery and right ventricular enlargement should not be considered incompatible with that diagnosis.

Radiological Findings and Their Interpretation in Diverticulosis and Diverticulitis.

B. S. WOLF, M. KHILNANI AND R. H. MARSHAK (*Am. J. Roentgenol.*, April, 1957) state that the radiological manifestations of diverticulitis are protean and distinct from the haustral deformities of diverticulosis. These changes are the result of purulent infection of a single diverticulum due to obstruction at its neck and interference with its drainage. For this reason a characteristic feature of diverticulitis is the failure to fill with barium the specific diverticulum which is the origin of the inflammatory process. The clinical picture associated with a perforated diverticulum is that of an acute severe inflammatory episode with signs of peritonitis and paralytic ileus. However, in most cases of acute infection of a diverticulum the peridiverticular inflammatory process is confined to a small area in the serosa and is of minimal severity and short duration. This appears to be true even in cases with extensive mural inflammatory changes, causing irregular defects in the barium column. In a patient predisposed to diverticular infection, multiple episodes due to serial involvement of different diverticula are common. These minor acute episodes may go on to complete resolution or may leave residual defects or deformities of little significance. The danger of an acute infection, however, is the possibility that a purulent focus may become permanently sealed off from the bowel lumen. This may then lead to a diffuse chronic reactive proliferative type of inflammatory change with fibrosis and marked hypertrophy of the muscular layer of the bowel wall: chronic indurative or proliferative diverticulitis. Since a collection of pus acts as if it were under pressure, internal fistulization is likely to occur. If the purulent material burrows within the wall of the bowel, a long segment of colon becomes chronically inflamed secondarily. The most useful feature is the demonstration that deformities or defects due to diverticulitis are covered by intact mucosa. This may not be true if multiple sinus tracts are present, but such tracts are unusual in carcinoma.

Unusual Pulmonary Changes Secondary to Chest Trauma.

R. GREENING, A. KYNETTE AND P. J. HODES (*Am. J. Roentgenol.*, June, 1957) state that varying degrees of trauma with or without rib fractures may produce pulmonary consolidations of varying size. In certain patients subsequent rounded cyst-like cavities develop and disappear without further therapy. These cavities may be unilocular or multilocular, and be centrally or eccentrically placed. The time of appearance of the cavity or pneumatocele may be immediate, within a few hours, or delayed for several days. Patients in whom such cavities appeared usually had a more prolonged time interval before the chest skiagram completely cleared than those without such cavities. This may be related to the severity of the chest trauma, although this conclusion is not at all certain. It is extremely important to recognize that such air-filled cystic spaces can form and that they are not tuberculous in nature, that they do not represent lung abscesses, and that they will completely clear within a relatively short period of time with no residual sequelæ and with little treatment other than symptomatic. In the authors' series of cases the minimum time of clearing was ten days and the maximum time three months. Contusions without pneumatocele formation or extensive fractures cleared in three days to three weeks.

The Familial Occurrence of Pulmonary Alveolar Microlithiasis.

M. C. SOSMAN, G. D. DODD, W. D. JONES AND G. U. PILLMORE (*Am. J. Roentgenol.*, June, 1957) state that pulmonary alveolar microlithiasis is not as rare as it was thought to be, and they report 23 further cases. The ætiology is unknown. The absence of the usual precipitating factors and the high incidence of familial occurrence strongly suggest an hereditary factor. Thirteen of the authors' cases occurred in five families. The condition could be due to an inborn error of respiratory metabolism at the alveolar interface, possibly an enzyme fault. The disease may be, and usually is, asymptomatic for years. It is most often discovered by "routine" chest radiography. The radiological appearance is characteristic and pathognomonic. Over-exposed or over-penetrated films are necessary to demonstrate the fine sand-like particles spread uniformly throughout both lungs, their density suggesting calcification, with only slight variation in size, sometimes accentuated along the pleural surfaces, but not conglomerate or coalescent. The combined density of the millions of microliths is frequently sufficient to obscure the outlines of the heart and diaphragm. The (i) long clinical course with pulmonary insufficiency occurring only years after recognition of the lesion radiologically, (ii) absence of tissue components in the concretions, (iii) normal appearance of the walls of alveoli-containing concretions early in the disease, and (iv) lack of a constant relationship to inhaled particulate agents suggest that the components of the concretions are derived from the alveolar capillary circulation and that the ultimate changes in the alveolar walls, which lead to pulmonary insufficiency, are secondary to the prolonged presence of these presumably progressively enlarging concretions. Should this represent the pathogenesis, it would imply that if the process could be halted even after some concretions had already formed, the ultimate pulmonary insufficiency might be averted. There is at present no known form of therapy to halt the progress of the disease or to cause remissions in its course. Treatment has been purely symptomatic.

Primary Pulmonary Eosinophilic Granuloma.

N. L. ARNETT AND D. M. SCHULZ (*Radiology*, August, 1957) present five cases of primary pulmonary eosinophilic granuloma. The clinical course is benign. Presenting complaints are chiefly chronic cough, weight loss, fatigue and low-grade fever. No specific therapy has been successful, although antibiotics, steroids and irradiation have been given trials. The need for therapeutic measures appears questionable. The radiographic appearance is that of a bilateral disseminated process of hæmatogenous-type spread, with granulomatous, nodular infiltration. The infiltrates are superimposed on a background of interstitial fibrosis and lobular emphysema. The radiographic appearance reflects two distinct tissue reactions: (*a*) nodular infiltrates composed largely of histiocytes and eosinophils, and (*b*) diffuse interstitial pneumonitis with fibrosis. Since no skeletal or visceral lesions have developed in any of the 11 reported cases of primary pulmonary eosinophilic granuloma, it is suggested that this condition be considered a separate disease entity.

Idiopathic Hypercalcæmia.

J. A. SHIERS, E. D. B. NEUHAUSER AND J. R. BOWMAN (*Am. J. Roentgenol.*, July, 1957) state that idiopathic hypercalcæmia is probably a rare and only recently observed disease of which many aspects remain to be clarified. The ætiology is unknown, but the most likely cause is considered to be hypersensitivity to vitamin *D*. Skiagrams show widespread osteosclerosis, evidence of defective bone formations and abnormal soft tissue calcifications. Osteosclerosis involves all bones, and is particularly apparent in the base and frontal regions of the skull, the vertebral bodies, the carpal bones and the epiphyses and the ends of the shafts of the long bones. It seems to affect mainly the spongiosa, for the bony cortex appears normal or sometimes slightly thinned. The increase in bone density may be amorphous, as in the base of the skull, or due to thickening and coarsening of the individual trabeculæ; it is not associated with disturbance of the trabecular pattern. The osteosclerotic changes are not distributed evenly, but

occur in bands or zones which shade off gradually into bone of normal or even diminished density, as if the intensity of the disease had varied at different stages of growth. Because of the way in which new bone is laid down, these bands appear transverse in the shafts of the long bones, and ring-like in the epiphyses, vertebral bodies and other round bones. Other bone changes are seen in addition to the osteosclerosis. They appear to be due to impaired bone formation. This is most evident at the ends of the long bones, which are cupped and often ill-defined; identical appearances may be seen in rickets and osteopetrosis. Ectopic soft tissue calcifications are most commonly seen in the renal parenchyma. Except for the hypotonia, the condition is indistinguishable clinically from renal acidosis, which does not, however, present the marked bone changes seen in hypercalcæmia. The clinical and X-ray findings may simulate those of hypervitaminosis *D*. This is really not surprising, as both are results of similar disturbances in calcium metabolism.

Radiographic Recognition and Differentiation of Parosteal Osteogenic Sarcoma.

G. M. STEVENS, D. G. PUGH AND D. C. DAHLIN (*Am. J. Roentgenol.*, July, 1957) state that parosteal osteogenic sarcoma is an unusual type of primary, malignant, densely ossified tumour of bone arising and proliferating juxtacortically. The main distinguishing radiographic characteristics are the encircling, dense, lobular and juxtacortical nature of growth, the failure of the lesion to destroy the cortex, the heterogeneity of ossification and the failure to produce periosteal elevation. The presence of a thin free space between tumour and cortex is often seen with the proper degree of obliquity of the view. Recurrence of the tumour after local excision is almost universal, which is similar to the seeding problem encountered in chondrosarcoma. The tumour usually reforms in the image of the primary lesion.

RADIOTHERAPY.

The Value of Irradiation in Ankylosing Spondylitis.

N. HOWARD (*Brit. J. Radiol.*, July, 1957) considers the value of radiotherapy in ankylosing spondylitis in the light of the recent Medical Research Council bulletin on "The Hazards to Man of Nuclear and Allied Radiations". Results are based on 455 patients treated with radiotherapy during the period 1940 to 1953, and followed up for more than two years (five to 10 years, 38%; 10 years and over, 31%). The disease was staged according to X-ray findings and the results evaluated as: good, 361 cases; moderate, 83 cases; no effect, 11 cases. Some 198 patients showed relapse and required retreatment, and the final evaluation was as follows: good, 345 cases; moderate, 77 cases; no effect, 33 cases. The technique of treatment is discussed, the probable dosage to gonads assessed, and the incidence of leuchæmia considered; this was ten times that of the general population. It is considered that the treatment is still justified in typical cases of ankylosing spondylitis in spite of the possible hazards.

Comparison of Radioactive Gold and Nitrogen Mustard in the Control of Neoplastic Serous Effusions.

F. J. BONTE *et alii* (*Radiology*, July, 1956) state that radioactive colloidal gold controls production of neoplastic effusion (especially due to ovary or breast carcinoma) in some 50% to 70% of cases. The authors have corroborated these results in some 60 patients. On comparison of these results with those obtained in 40 patients treated with nitrogen mustard instilled into the malignant effusion, the same order of effectiveness was observed. The advantages of nitrogen mustard over Au^{198} are its availability and lower cost. Moreover, radioactive gold necessitates precautionary measures and training for safe handling. The nitrogen mustard is effective only when instilled directly into the effusion.

Augmentation of Radiotherapeutic Effect by Cancer Chemotherapy.

M. M. KLIGERMAN AND D. M. SHAPIRO (*Radiology*, August, 1957) report that mammary adenocarcinoma 755 has been transplanted into subcutaneous tissue of the left thigh of male mice and allowed to grow. These have then been treated by radiation alone, by chemotherapy alone or by both combined. The X-ray dosage used was sufficient to eradicate completely only a small percentage of tumours by itself. Chemicals used were 8-azaguanine, testosterone, desoxypyridoxine and 6-aminonicotinamide. In the group receiving only chemicals, regression was only transient, as was the effect with X rays alone at the chosen dosage. There was a markedly increased effect with the combination of X rays and chemicals, this regression being maintained until the time of sacrifice of the animals. It should be noted that some of the compounds may be too toxic for human administration.

Eosinophilic Granuloma of Bone.

J. G. TEPLICK AND H. BRODER (*Am. J. Roentgenol.*, September, 1957) present a case of eosinophilic granuloma of the acromion in a woman of 62 years. A review of the literature shows that only some 5% of cases have occurred in patients over 30 years of age. In the case reported, X-ray therapy produced an excellent result, and most authors regard radiotherapy as the preferred method of treatment. A discussion of the salient features of eosinophilic granuloma is included, and there is a brief review of its relationship to Hand-Schüller-Christian disease and to Letterer-Siwe disease.

Oxygenation in Radiotherapy.

I. CHURCHILL-DAVIDSON *et alii* (*Brit. J. Radiol.*, August, 1957) begin by stating that the sensitivity of all cells to damage by ionizing radiation is related to the oxygen tension around them at the time of irradiation. In all types of neoplasm there may be areas of low oxygen tension, and cells in these areas are protected from injury during conventional radiotherapy and may survive to cause recurrence. The oxygen tension around such cells may be increased by the inspiration of additional oxygen, but owing to the mechanism of oxygen transport to the cells, the use of oxygen at high pressure in inspired gases is necessary. Such a pressure chamber has been evolved, but requires a general anæsthetic to prevent convulsions, and bilateral myringotomies to prevent damage to the middle ear. The enhanced effect of radiation in human patients breathing oxygen at three atmospheres' pressure has been demonstrated histologically. All patients had advanced neoplasms, and the results of treatment of 35 patients are discussed.

NEUROLOGY AND PSYCHIATRY.

Psychosomatic Approach to Anxiety.

R. GRINKER (*Am. J. Psychiat.*, November, 1956) states that the Freudian notion conceived of anxiety as arising from repressed libidinal drives—e.g., repressed anger, oral dependency and depression. In his opinion, the concept of unconscious anxiety is not a fruitful hypothesis for the study of psychosomatic illness, because anxiety must be conscious to evoke particular idiosyncratic symptoms. Lesser quantities of anxiety are synonymous with alertness, vigilance or a state of preparation against danger. With the greater quantities of anxiety there is an awareness of the physiological processes; temporarily it may lead to facilitation of behavioural processes, but further increase of anxiety is associated with disorganization and regressive behaviour. At this stage are developed various syndromes that are viewed as chronic defences against anxiety. Anxiety increases the subject's awareness and fear of physiological expression of anxiety. Identical patterns of reaction reappear with recurrent bouts of anxiety. The conditioning appears to take place in early life. Unless anxiety is severe, the somatic locus is confined to one particular bodily function and does not spread to all systems. In the author's war experience, prolonged severe anxiety was accompanied by profound generalized metabolic disturbances which aged the soldier rapidly. There is very little that is definite regarding somatic function in relationship to anxiety. Some observations and deductions have been made, but the subject requires further study.

"Ambulatory Schizophrenia."

G. ZILBOORG (*Am. J. Psychiat.*, December, 1956) identifies as "ambulatory schizophrenia" that group of conditions which have otherwise been spoken of as "intermediate" or "pseudo-neurotic" schizophrenia. This group, he believes, are amenable to psychotherapy regardless of the apparent inability to perform free associations. He believes that the super ego is too strong in asserting itself and is forcing the schizophrenic to suppress the sexuality, rather than that the ego is too weak to assimilate the sexual drives. He relates the case of a girl, aged 18 years, who over a period of four years, and with variable psychotic symptoms, eventually developed a normal interest and social adjustment. He emphasizes that earlier diagnosis leaves more time and opportunity for psychotherapy.

Brush Up Your Medicine.

VOMITING IN THE NEWBORN.

VOMITING in the neonatal period is a very common symptom. While a certain amount of regurgitation may occur, persistent vomiting is a symptom which should not be neglected, particularly when it is the presenting symptom. As diagnosis of the cause is essential, this facet only is considered here.

The neonatal period strictly covers the first 28 days of life; this fact, of course, will bring into the picture some causes of vomiting other than those occurring in the immediate post-natal period.

Although a classification is often incomplete and unsatisfactory, nevertheless, when a wide subject is being considered, it is helpful to make one. Vomiting in the newborn may be classified broadly into obstructive and non-obstructive causes, as follows:

Obstructive causes:

(*a*) Œsophageal atresia.
(*b*) Cardio-œsophageal abnormalities.
(*c*) Congenital pyloric stenosis and pylorospasm.
(*d*) Intestinal atresia and stenosis.
(*e*) Meconium ileus.
(*f*) Intestinal malrotation and malfixation.
(*g*) Strangulated hernias, internal and external.
(*h*) Hirschsprung's disease.

Non-obstructive causes:

(*a*) Infection—(i) enteral, (ii) parenteral.
(*b*) Increased intracranial pressure—(i) hæmorrhage, (ii) cerebral œdema, (iii) hydrocephalus.
(*c*) Hæmorrhagic disease of the newborn (hypoprothrombinæmia).
(*d*) Irritative vomiting.
(*e*) Feeding errors—(i) overfeeding, (ii) underfeeding with aerophagy, (iii) eructation of wind with regurgitation of milk, (iv) rumination, (v) difficulties with artificial feeding.

Obstructive Causes.

Œsophageal Atresia.

While œsophageal atresia is a very definite cause of vomiting, for best results it should be diagnosed before any feeding has been attempted. If the nursing staff and resident medical officers are on the alert, it will be noticed in these cases that a great excess of frothy mucus issues from the infant's mouth. If this has not been noted, at the first feed, after taking a few mouthfuls, the infant will vomit, begin to cough explosively and become cyanosed, and this sequence of events will be repeated at each subsequent attempt at feeding. The diagnosis is made by the passage of a rubber catheter via the mouth. If it is arrested at a point less than four inches from the gums, and stomach contents cannot be withdrawn, œsophageal atresia is almost certainly present. One fallacy is that the tube may reach the blind end and curve back upwards again. Naturally, stomach contents cannot be withdrawn; but the introduction of a few cubic centimetres of "Lipiodol" and radiographic examination will readily outline the blind pouch and catheter.

Cardio-Œsophageal Abnormalities.

Under the heading of cardio-œsophageal abnormalities are included lax œsophagus, hiatus hernia and short œsophagus with minor degrees of partial thoracic stomach ("sliding" hernia).

1. Lax œsophagus, also called cardio-œsophageal relaxation, was first described by Berenberg and Neuhauser in 1947. The picture is that of vomiting, which is never forceful, occurs in the first 10 days of life and most often with the infant in the decubitus position, and is relieved by propping the infant upright during and after feeds. The diagnosis is made by means of a barium bolus and fluoroscopy; the œsophagus appears larger than normal, thin-walled and relatively flaccid. Œsophageal peristalsis is diminished in strength and frequency, and the œsophagus appears as a flaccid tube leading to the stomach. The œsophagus fills during inspiration and also with slight abdominal pressure. Reverse peristalsis does not occur.

2. Hiatus hernia and short œsophagus cause vomiting in the first days of life, often beginning on the first day. The vomiting may be forceful and the vomitus is often blood-stained, with flecks of either bright or old blood. Occasionally quite profuse hæmatemesis or melæna may occur. These infants are usually diagnosed initially as suffering from hæmorrhagic disease of the newborn; but the continuance of hæmorrhagic vomiting in spite of treatment suggests the diagnosis. This is confirmed by fluoroscopy with a barium bolus and posturing in the Trendelenburg position; by this means a pouch of stomach may be shown above the diaphragm with the cardia in the normal position, or folds of gastric mucosa may be shown to run through the hiatus to a cardia situated above the diaphragm.

Pyloric Stenosis and Pylorospasm.

Pyloric stenosis commonly begins in the third week of life, but vomiting may begin earlier, even in the first week. One of the early characteristics of the vomiting is that it does not occur with each feed. One or more feeds are retained without vomiting, and then a really copious vomit will occur, the vomitus being of a greater volume than the feed just ingested. Furthermore, the vomiting initially is not always projectile, although this characteristic usually develops after a few days, and vomiting may occur during the feed as well as after. The diagnosis is made by the triad of projectile vomiting, visible peristalsis and a palpable pyloric tumour. The tumour is best felt with the left hand from the left side of the infant, and feels like "the tip of the nose".

The condition must be differentiated from pylorospasm, which occurs in hyperactive, easily excitable infants. In a series cited by Frew the following figures were noted (Table I):

TABLE I.

Symptom.	Pylorospasm.	Pyloric Stenosis.
Forcible vomiting	60%	81%
Visible peristalsis	26%	94%
Constipation	6%	89%

Intestinal Atresia and Stenosis.

These infants always begin vomiting on the first day of life, either during or after feeds. As the obstructions are rarely above the papilla of Vater, the vomitus is usually bile-stained.

Babies with duodenal and jejunal atresia usually vomit at the first feed, but those with lower obstructions may retain a feed or two. However, with subsequent feeds, the vomiting becomes progressively more severe. The character of the vomiting also depends on the site of the obstruction, the higher atresias giving rise to a thin yellow vomitus, the lower atresias to an offensive fæcal type. The stools in the latter case are usually smaller in amount, drier and greyish-green in colour. Farber's test for the presence of cornified epithelial cells in the stool has been shown to be of little value in the diagnosis of intestinal atresia. Abdominal distension is usually present in the lower obstructions, and some degree of fever is present in most cases.

A plain X-ray film of the abdomen confirms the clinical diagnosis by showing fluid levels and gut grossly distended with gas.

Meconium Ileus.

Meconium ileus presents with the symptoms of intestinal obstruction. Vomiting begins on the first day and becomes progressively more intense. Constipation is present, and mostly no meconium is passed at all. Rectal examination reveals a stricture at the ano-rectal junction due to incomplete development of the hind-gut. Radiographic examination reveals distended gut and fluid levels as in all obstructions; but variation in width of the loops of gut and uneven filling with gas with a granular appearance in the meconium shadow may be suggestive. The diagnosis is often unsuspected until laparotomy; but a history of previous siblings' being affected by fibrocystic disease of the pancreas is suggestive.

Intestinal Malrotation and Malfixation.

Intestinal malrotation and fixation present in the first weeks as intestinal obstruction, either complete or partial, the former due to peritoneal bands attached to the misplaced caecum and obstructing the descending part of the

duodenum, the latter to volvulus of the mid-gut. However, the two conditions may coexist. The complete obstructions offer no difficulty in diagnosis, but the partial obstructions do. In these the vomiting is intermittent, the stools are normal for the age, and X-ray examination with a barium meal and follow-through may reveal no obstruction. An abnormal position of the caecum and ascending colon may be the only finding.

Strangulated Hernias.

Both internal and external types of strangulated hernia present as intestinal obstruction. However, a careful examination of the hernial orifices may reveal a strangulated external hernia. I have seen two cases in the neonatal period, one at 14 and one at 24 days; both the babies had passed loose green stools prior to the onset of obstructive symptoms.

Hirschsprung's Disease.

Infants with Hirschsprung's disease begin vomiting in the first weeks of life, the vomiting being accompanied by abdominal distension and the passage of only a small amount of meconium. A plan X-ray film of the abdomen shows moderate and diffuse distension of the small and large intestine, and in general the infant presents a picture of intestinal obstruction without obvious cause.

X-ray examination with a barium enema at this stage shows an apparently normal colon. Subsequently in most cases the bowel is evacuated spontaneously, and the infant is apparently normal, with no abdominal distension and normal bowel movements. After some days the symptoms return, and again spontaneous evacuation of the bowel gives rise to a period of apparent normality. After this the obstructive symptoms occur more frequently and the apparently normal periods become shorter, until the classical picture of chronic constipation and abdominal enlargement and the typical X-ray findings of Hirschsprung's disease are evident. This may occur as early as the age of three weeks.

Non-Obstructive Causes.

Infection.

Infection may be enteral or parenteral.

Enteral Infection.—Bowel infections due to specific organisms commonly cause both vomiting and diarrhœa. The vomiting is non-specific and may be forceful or not. Similarly the motions are frequent, loose, and yellow, greenish-yellow or green, and contain mucus in most cases. Dehydration may be present, but usually physical examination reveals no other abnormality. The diagnosis is suggested by the symptoms and by culture of the stool. The organisms may be known specific pathogens or bacteria whose ætiological relationship is suspect. In the former group are dysenteric organisms and salmonella, which are uncommon in the newborn, and *Pseudomonas pyocyanea* and *Staphylococcus aureus,* which are more commonly present. In the latter group are the coliform bacilli, the paracolon bacillus and *Proteus vulgaris.*

Parenteral Infection.—This group includes respiratory infections, *otitis media* and pyelonephritis most commonly, and less so, meningitis, septicæmia and perinephric abscess. In any of these conditions vomiting may be the presenting symptom or an incidental finding. The respiratory infections include naso-pharyngitis, bronchitis, bronchopneumonia and pneumonia following aspiration collapse. These conditions along with *otitis media* may be diagnosed by the clinical examination alone. Pyelonephritis is a rather more obscure condition. Often vomiting is the only symptom and there are no clinical signs; this includes a lack of rise in temperature. Diagnosis rests on microscopic examination of the urine. In these cases I have found cell counts of more value than examination of centrifuged specimens, a Fuchs-Rosenthal counting chamber being used, and a count of more than 30 cells per cubic millimetre being taken as abnormal. In most cases the organism can be grown or cultured, and is commonly *B. coli* or *Staph. aureus.* The remaining infective conditions are usually fairly obvious; however, perinephric abscess may cause difficulty until it presents a swelling in the renal angle.

Comment.—As regards neonatal infection in general and that of premature infants in particular, it must be remembered that many infants may not have any pyrexia unless there is associated dehydration, and that a temperature rise may be terminal.

Increased Intracranial Pressure.

This group includes intracranial hæmorrhage, cerebral œdema and hydrocephalus. In these cases there is usually an abnormal obstetric history, either during delivery or in the immediate post-natal period—*e.g.,* long or precipitate labour, abnormal presentation, forceps deliveries and *asphyxia livida* or *asphyxia pallida.* These infants vomit early, commonly on the first day of life, and there are always associated symptoms which help the diagnosis. These are: a tense anterior fontanelle, a shrill cry, early hypotonicity and later hypertonicity of limbs, upward deviation of the eyes, twitching of eyes or limbs, and later some neck rigidity. In the babies who survive, particularly those with cerebral œdema following neonatal asphyxia, the vomiting lessens with the decrease in intracranial pressure.

Hæmorrhagic Disease of the Newborn.

Hæmorrhagic disease of the newborn commonly occurs from the second to the seventh day, and is manifest by hæmorrhagic vomitus, either containing bright blood or coffee-ground. However, it may occur in the first day of life. It must be differentiated from "irritative" vomiting due to swallowed maternal discharges, hiatus hernia and hæmatemesis from blood swallowed from cracked nipples. "Irritative" vomiting occurs within the first 12 hours. The vomitus is brownish and mucoid, never bright, and later biliary. The condition is relieved by gastric lavage. Hiatus hernia has been mentioned previously. Cracked nipples as a source of blood are elucidated from the history.

Although I have mentioned some differentiating points, it is probably safest to treat all cases of neonatal hæmatemesis as hæmorrhagic disease of the newborn and to administer vitamin *K* initially, subsequent treatment and investigation depending on the patient's progress.

Feeding Errors.

The group is the most heterogeneous and the least satisfactory to diagnose individually. The vomiting usually begins in the first week, and is not projectile: the vomitus is rarely bile-stained. Vomiting may occur during the feed, immediately after with eructation of wind, or after the baby has been put down. A careful inquiry into the nature of the feeding should be made—*i.e.,* whether the feeding is rapid or slow, the amount taken at each feed, the mother's milk supply, whether the baby is wholly breast-fed, or partly or completely artificially fed, and if so, the exact mixture given. Analysis of breast milk shows that it is not the cause of vomiting, and if the infant vomits breast milk, he is even more likely to vomit cow's milk. However, an infant who has tolerated breast milk without vomiting may begin to vomit with the introduction of cow's milk.

Let us now take some of the causes individually, although they may operate together at times.

Over-Feeding.—Over-feeding usually causes vomiting after the feed, small amounts being vomited at intervals subsequently. Vomiting usually begins on the third day, at the time when the maternal milk flow begins. At this stage there is a copious supply of milk, and the infant's stomach has not had time to adjust itself to large volumes, as may be seen from the following figures: at birth the capacity is about one ounce, at four days one and a half ounces, and at two weeks two and a half ounces. Test weighings in these cases may show an intake of four to six ounces. In many cases the condition is aggravated by rapid feeding, either because of vigorous suction or because of an unusually active "draught reflex" on the part of the mother. In the latter case the infant is forced to gulp rapidly to avoid choking, and milk may even spill out from the infant's mouth around the nipple. Inevitably the infant regurgitates part of the feed later.

Under-Feeding with Aerophagy.—This is associated with the ingestion of a large amount of air and a small amount of milk. It occurs in breast-fed infants when the milk supply is deficient and the infant has been sucking for some time at an empty breast. Test weighing reveals the cause in these cases.

Rumination.—This may begin at any time. The stomach contents are regurgitated, chewed and swallowed time and time again, and during the process some of the feed spills out. It is often associated with sucking the thumb or fingers, and if these are pulled out of the mouth some of the feed comes too. On occasion one can even hear the fluid going up and down the œsophagus. The vomiting in these cases is never forceful, and except in severe cases the nutrition of the infant does not suffer.

Difficulties with Artificial Feeding.—In these cases the vomiting dates from the introduction of artificial feeding. Some infants do not tolerate full-cream dried milk. Others may have been given excessive amounts or too great a concentration of boiled cow's milk too early. Allergy to

cow's milk, due to the lactalbumin or lactoglobulin, is described as a cause of vomiting. A patch test on the skin provides a rough method of eliminating this cause.

Conclusion.

With regard to the investigation of vomiting in the neonatal period, the history is of prime importance. The following points should be noted: the mother's condition during pregnancy, the duration of labour, the nature of the delivery and the infant's condition at birth—whether cyanosed or pale, the strength of the cry and the presence of an excess of mucus in the mouth.

The feeding should be investigated carefully, and the vomiting analysed in detail as to the initial onset, the time-relationship with the feeds, the appearance of the vomitus, and whether the vomiting is forceful or not. The stools are also investigated as to the frequency and type—*i.e.*, meconium, changing, or milk stool.

Of the special investigations some will be suggested by the history and physical examination—*e.g.*, X-ray examination of the chest, a throat swab and cultural examination of the stools. However, physical examination may reveal no obvious cause for the vomiting, and if the history has been unrevealing further investigations are necessary. Most helpful are a plain X-ray film of the abdomen and a microscopic examination of the urine, and if these give negative findings, an X-ray examination with a barium bolus and posturing in the Trendelenburg position. The use of a barium enema may reveal a malrotation and later Hirschsprung's disease.

In spite of careful investigation, there still remain a few cases of vomiting in infants which defy diagnosis. Observation and repeated investigations, particularly X-ray examination with a barium bolus for cardio-œsophageal abnormalities, may narrow these down; but some patients we are forced to treat symptomatically. Fortunately, in most cases these infants eventually cease vomiting and go on to a normal childhood.

Finally, one should bear in mind Ladd's dictum—that any newborn who vomits persistently, and particularly any baby who vomits bile, should be fully investigated without delay.

N. M. NEWMAN, M.R.C.P., M.R.A.C.P., D.C.H.
Hobart.

The Wider View.

MEDICAL PROGRESS IN MALAYA.

AT the northern approach to the Straits of Malacca, off the western shores of the Malay Peninsula, lies the beautiful island of Penang. Jungle-clad and almost uninhabited a couple of centuries ago, the island was occupied in 1786 by the East India Company as a port-of-call for East Indiamen bound to and from China.

Immigrants, drawn by the opportunities for trade, poured into the young colony, setting the stage for the epidemics of disease which have so often darkened the early days of pioneer settlement in tropical countries. Waves of the deadly "Pinang fever" swept through the island, where the climate, it is said, "proved fatal to two Governors, all the Council, and many of the new settlers".

Half a century later, in 1857, a small group of Chinese immigrants settled on the western plains of the Malayan mainland to mine for tin. Their venture was unrewarded; two months later only 18 of the original 80 were left, "such were the ravages of fever and tigers". But others went and stayed, creating the settlement which is now Kuala Lumpur, capital town of the Federation of Malaya.

Early Hazards.

Such were the hazards to health with which the early medical services had to contend. Though there were busy hospitals at Penang and Malacca, and medical services in the main towns of the interior before the end of the century, the doctors were groping in the dark with diseases they did not understand, and were powerless to control the epidemics which came with the felling of jungle and the clearing of new land.

But medical thought was soon to be stirred by a ferment of new ideas. By the turn of the century, Pasteur and Koch had proved the importance of minute living organisms as a cause of disease; Laveran had found the parasite of malaria; Ross had shown that malaria is carried to man by the bite of mosquitoes; and from the great teaching schools of the West the new ideas were diffused and extended.

How the new knowledge, applied in Malaya by the Government and private medical services, has since subdued the major epidemic diseases, and how Malaya has sometimes contributed to the scientific advances which have made this possible, will remain one of the stirring pages of Malayan history.

In 1955, states the Annual Report of the Medical Department, the Federation was free from cholera, plague and smallpox; there were more deaths from motor accidents in the government hospitals than from malaria, typhus and beriberi combined; and the population growth was among the highest in the world—3%, with a birth rate of 43·8 per thousand and a death rate of 12·2.

To the remarkable changes which this report reveals, public health education and rising social standards have made a significant contribution; but the dominant role has been that of the medical services, working steadfastly in the growing light of scientific discovery.

The Defeat of Malaria.

Take malaria, for instance, with its age-old cycle, mosquito to man, man to mosquito, which must be broken to prevent the disease. Eliminate the mosquitoes, and malaria will disappear.

Applying this knowledge, Dr. Malcolm Watson, a government medical officer in Malaya, sought to destroy the larvæ of the malaria-carrying mosquitoes. His antilarval methods scored their first resounding success when, in 1902, they saved Port Swettenham, threatened with closure by the Malayan Government on account of a raging malaria epidemic. To these methods the towns of Malaya owe their present freedom from malaria; they brought to the plantations a powerful weapon for combating the epidemics which darkened the early days of the rubber industry; and they had an immeasurable influence on malaria control throughout the world.

Malaria may be controlled also by drugs which destroy the seed-bed of infection in the human body. Synthetic compounds of great promise have been evolved in recent years, "Atebrin" in 1932, and others, even better, since. Highly efficient in appropriate conditions for malaria prophylaxis, these drugs have kept the malaria contracted in jungle warfare against Communist terrorists at a low ebb; and they are partly responsible for the marked recession of malaria throughout Malaya in the post-war years.

Much of the pioneer work on the application of "Atebrin" to the complex problems of malaria in human communities, work now woven into the general pattern of medical progress, was done on the Malayan rubber plantations before World War II.

These two ways of attacking malaria, either through the mosquito larvæ or through the parasite in man, were reinforced during the war by a third, the direct assault on the adult mosquito, which became possible with the discovery of powerful mosquito poisons like DDT, which stay active for many months when sprayed on the walls of houses.

Malaya, harassed by enemy occupation, played no part in this important advance. The lost ground is being made good; the insecticides are making a vital contribution to the prevention of malaria in the "kampongs" and new villages, and there is a confident hope that the spraying of houses, supplemented by the older methods, will hasten the day when malaria will be a disease of the past.

Fight Against Beriberi.

Fifty years ago, the Chinese victims of paralytic beriberi, limping along with their curious high-stepping gait, were often seen in the streets of Kuala Lumpur. So high was the incidence of the disease that many of the hospitals had special beriberi wards.

In the main Kuala Lumpur hospital nearly 25,000 beriberi patients were treated during the years 1883-1902. Many of the victims died; and the survivors, swollen with dropsy and crippled with paralysis, were restored to health only after a long illness. Today the disease has almost gone, the cause, lack of the anti-beriberi vitamin in the diet, having been illumined by scientific inquiry, mainly in Java and Malaya.

The first hint of the cause, cutting across all the fanciful theory, came from Christiaan Eijkmann in Java, who produced a paralytic disease in fowls by feeding them on deficient diets, work for which he was awarded a Nobel prize; but it was W. L. Braddon in Malaya who, from epidemiological evidence, related human beriberi to a diet of polished rice, and Henry Fraser and A. T. Stanton, at the Institute for Medical Research in Kuala Lumpur, who finally proved that the presence in the diet of an essential

substance found in the outer layers of the rice grain would prevent beriberi, as surely as the absence of this substance would cause the disease.

Typhus and Typhoid Fever.

Less common in Malaya, but more deadly, is the mite-borne infection known as scrub or tropical typhus. Known for centuries in the river valleys of Japan, and recognized more than forty years ago in Sumatra, scrub typhus has been most thoroughly studied in Malaya, where in the years before World War II the cause and biological background were illumined by the studies of C. H. Fletcher, Professor Raymond Lewthwaite, and Savoor in Kuala Lumpur. But there was no cure, and the menace of the disease loomed large in the Burma campaign.

The dramatic change which came in 1948 is fresh in the memory. In March of that year, a group of American doctors, led by Dr. Joseph E. Smadel and collaborating with Dr. Lewthwaite and his colleagues in Kuala Lumpur, began their trials of "Chloromycetin", an antibiotic substance derived from a Venezuelan mould. They gave the drug to patients with scrub typhus, acquired on the plantations or in jungle warfare, and proved that a few tablets, taken by mouth as easily as aspirin, would dispel the fever in a little over twenty-four hours.

For typhoid infections, as for scrub typhus, there was no specific cure until 1948, when, in the course of their studies in Malaya, Smadel and his colleagues gave "Chloromycetin" to a young Indian with typhoid fever, the first typhoid patient to be treated in this way. The infection was arrested, and with this lead began the work in Kuala Lumpur which brought the first notable advance in the treatment of this prolonged and often serious febrile illness.

Present-Day Medical Services.

The medical services of the Government of Malaya today comprise the medical departments of each of the nine States and two settlements, operating independently but coordinated in Kuala Lumpur, and the urban services controlled by the municipalities and by a medley of town boards and councils. In 1955 they employed 369 of the 785 doctors registered in the Federation, 55 dental officers, and 3560 nurses, midwives or hospital assistants; and they maintained 20,000 beds in 71 hospitals, with 261 dispensaries and 553 maternity or child welfare clinics. The recurrent expenditure on medical and health services was 52,899,167 Malayan dollars—9·6% of the total recurrent expenditure of the Government, representing a per-capita cost of 8.75 dollars for the estimated population of 6,058,317.

Supplementing the government services were the hospitals (161 hospitals with 6256 beds) and dispensaries maintained by the rubber companies, medical missions and other private interests; the voluntary teams organized by the British Red Cross and St. John Ambulance Societies, mainly for work in the new villages created during the emergency conditions of recent years; and the technical and financial aid for special work from the World Health Organization, the United Nations Children's Fund and the United Kingdom Government.

Plans for the Future.

Spreading step by step over the years, from the coastal settlements to the inland towns, and from the towns to the countryside, the medical services today are reaching out to the remotest "kampongs". They have grown steadily since the war, and there are ambitious plans for future development, with an emphasis on the expansion of medical facilities in the rural areas.

Already, travelling dispensaries penetrate deep into the interior, bringing drugs and advice to the villagers; numerous fixed dispensaries and maternal and child health clinics diffuse the benefits of modern medicine; while the current developments include a rural health training school and eight district health centres.

It is here, in the "kampongs" of the Malays, that the needs are greatest, and here that the most rapid progress is to be expected in the coming years. The problems are formidable, but they are being tackled with resolution, and the outlines of the medical and health services of the future, comprehensive in their scope and far-reaching in their social and geographical range, are beginning to emerge.

JOHN W. FIELD,
Former Director of the Institute for Medical Research, Federation of Malaya.

On the Periphery.

REFLECTIONS ON THE STATUE OF AN EGYPTIAN PHYSICIAN.

THE following free verse, by Festub, was suggested by the statue of a physician of ancient Egypt at Gloucester House, Sydney.

IMHOTEP 2270 B.C.

He sits before the main door of the hospital;
An open scroll on his knees.
His face is foreign, inscrutable, calm.
He punched a small hole
In the curtain of ignorance
That binds mankind in darkness;
And the light of truth
Revealed to him certain things which were true.
He wrote these things on the scroll
In the hope that those, after him,
Would enlarge the hole,
And, in their turn, add their morsels of truth to the record.
A car arrives: the lamps light up his face,
Not inscrutable; I see there hope,
And faith in the future of man.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

ON THE TEACHING OF SCIENCE IN SCHOOLS.[1]

[Professor T. P. Anderson Stuart at the Intercolonial Medical Congress, Melbourne, January, 1889. From the *Australasian Medical Gazette.*]

I CONFESS that I am not sure how far the teaching of what is ordinarily called science may be introduced into primary schools, but I have no hesitation in saying that some measure of elementary scientific teaching should be given to all children without distinction. To the boy who will afterwards get such teaching at the University where in all likelihood he will begin at the beginning it is not a matter of such moment, but for the great majority of boys who will not get any instruction at all in natural science, if not at school, it is a matter of the very greatest importance. Of course what I say of boys I say equally of girls. It is unfortunately the case that, as yet the best teachers are all literary and mathematical teachers, and consequently the best teaching is still of a literary and mathematical nature. So long as the teaching of natural science in schools is a sort of extra thing, done at odd times, done in most insufficient measure, and too often in an inefficient manner, so long as the study of letters and abstract mathematics thus completely overshadows the study of everything else, so long will the present unsatisfactory state of matters continue.

Correspondence.

COMPLETE UNILATERAL DEAFNESS.

SIR: So often I have been surprised at unilateral complete deafness being overlooked, that I should be becoming used to it. This ought not to be so.

The excuse for the patient's not knowing he is deaf is that with full hearing in one ear he is hardly incapacitated. He sometimes knows that when he is walking with people he does not hear their conversation as readily when they are on one side of him as when they are on the other. Strangely enough, in spite of this, he often fails to conclude he is even partially deaf. His main disability is, of course,

[1] From the original in the Mitchell Library, Sydney.

that he only has one ear, and no spare parts are available if it, too, fails from any cause. The commonest way these patients discover their deafness is when changing sides with a telephone receiver.

There is less excuse for the medical men not realizing that the patient's deafness in one ear is total. This is because the thickness of the palm of the hand or tips of the fingers is insufficient to obliterate speech sounds in a healthy ear. A few patients have such excellent hearing on one side that a conversational voice is audible at 10 feet through a hand obliterating it. So, with ordinary tests, these cases of total unilateral deafness can appear to hear a conversational voice at various distances up to 10 feet in their stone-deaf ear.

When, however, a Bárány's noise producer is introduced into the better ear, the doctor can shout loudly, but the patient does not know that he is even being spoken to.

Without the aid of such a noise producer some appreciation of the patient's degree of deafness is possible by making him rub the opposite ear with the palm of the occluding hand. The rustling noise does somewhat mask the other ear.

Sometimes, even before commencing my examination, I have had a suspicion that I may have a case of unilateral total deafness to deal with when a patient, who appears to be hearing me easily, sits with the head rotated slightly so that one ear is turned in my direction. This is a sign I have not seen referred to previously.

The commonest cause of the phenomenon of perfect hearing in one ear with total deafness in the other is mumps labyrinthitis. This again is something to arouse surprise, for the diagnosis of mumps largely depends on the parotitis becoming bilateral as the disease develops. It is, therefore, more than fortunate that the complication of labyrinthitis in mumps is almost invariably unilateral.

Yours, etc.,

A. B. K. WATKINS, M.S. (London), F.R.C.S. (England).

223 Macquarie Street,
Sydney,
November 19, 1957.

THE ABORIGINES OF THE WARBURTON RANGE AREA.

SIR: The articles by Dr. W. S. Davidson and others in this Journal on October 26 present to the medical profession the results of a survey conducted by the Western Australian Health Department concerning the medical welfare of a group of Western Australian aborigines.

This subject has unfortunately been the centre of considerable and bitter controversy, and I think it is proper to place before the profession the facts presented by those who disagree with the findings of this survey.

In his preliminary report on this same subject, Dr. Davidson says: "It can be said here and now that no manifestation of starvation, or any condition remotely resembling starvation, was elicited from the natives presented for our examination." Although this same statement is not repeated in the articles to which I am referring, yet I think it would be fair to say that it was a true reflection of the general tenor of these articles. The reason that I have entered into this controversy is that I have witnessed a film taken by W. Grayden, S. Lapham and Pastor Doug Nichols who were in the same area at the same time as the medical group conducting the survey. I did not have to rely upon my medical training one iota to see in the film gross evidence of malnutrition.

Why, then, the discrepancies between the findings of the medical survey and this film? Mr. Grayden gives the reasons for this in his book "Adam and Atoms", and I shall now quote from it:

> As the medical survey progressed it became obvious that everything possible was being done by officers of the Native Welfare Department and some others in the area to play down the plight of natives on the Reserve for the purpose of counteracting in some measure the publicity which followed the findings of the Parliamentary Select Committee. In regard to this, little effort was made to ensure that as many natives as possible were examined by the medical party. A number of natives whom we knew to be in need of medical treatment and who were readily accessible, were not brought in for medical examination or treatment. . . . When the medical party arrived at the Warburton Mission the latter was still in recess for the Christmas holidays. The Mission resumed activities again on the 4th March, the day before the medical party left the area. As it invariably takes weeks and sometimes months before they all return after the Christmas holidays, many natives normally at the Mission were not seen by the medical party. The missionaries informed us that on being advised of the arrangements for the medical survey, they wrote to the Public Health Department pointing out the position which would obtain on the Reserve if the proposed schedule was adhered to, and recommending that the survey be made a few weeks later. At Mittiga waterhole the party of 43 natives were told by a Native Welfare officer, in our presence, to take "ten days" to journey back to the Mission. At that stage it was known to him the Medical Party would have completed its survey on the Reserve before that time. In actual fact, although the main group of natives reached the Mission in less than seven days, they were still too late for the examination as the medical party left the Mission, on the return journey to Perth, the day before the natives arrived at the Mission.
>
> Similarly, at the Giles Weather Station the medical party saw less than fifty natives, although it was known that there were over one hundred in the area, all of whom could have been easily assembled.
>
> Apart from the predisposition on the part of various people in the area to present only the favourable side of conditions on the Reserve to the visiting expedition, there was in addition a marked reluctance on the part of the natives to present themselves for examination if the ailment suffered was a serious one. This can be attributed mainly to a fear of the treatment required or, in the case of the children, a fear by the parents that the children would be taken from them and sent away. Unfortunately, three children sent to Perth from the Warburton Mission in the previous twelve months had not been returned to the Mission. The parents were extremely worried about these children and constantly asked the missionaries when they would be returned. This complaint was made before the Select Committee and reference was made to it by the members of the Committee on their return to Perth, but at the time of the medical party's visit the children had still not been returned. As a consequence the parents had a very real basis for their fear of having their children taken away from them. . . . The medical party saw only the natives gathered at white men's outposts, and as a consequence, less than half of the natives in the area investigated by the Select Committee were contacted. At least a number of natives scattered throughout the Reserve were either too weak or too ill to struggle in to the Mission, even had they been willing to do so while the medical party was in the area.

It is to be hoped that in the interim that those who conducted the survey have viewed the film to which I have referred and have accordingly thought fit to investigate the health of the aborigines in this area more thoroughly.

Yours, etc.,

BARRY E. CHRISTOPHERS.

366 Church Street,
Richmond, E.1,
Victoria.
November 12, 1957.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes *etc.* are promulgated in the *Commonwealth of Australia Gazette*, No. 59, of October 31, 1957.

AUSTRALIAN MILITARY FORCES.

Australian Regular Army.

Royal Australian Army Medical Corps (Medical).

3/40054 Captain J. H. Cater relinquishes the Temporary rank of Major, 23rd September, 1957, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Southern Command), 24th September, 1957.

The Short Service Commission granted to 2/40110 Major D. C. Cook is extended until 26th October, 1959.

2/40188 Captain F. N. Dwyer is appointed from the Regular Army Special Reserve, Royal Australian Army Medical Corps (Medical), and to be Captain, 15th January, 1957, with a Short Service Commission for a period of two years. [In lieu of the notification respecting this officer which appeared in Executive Minute No. 33 of 1957, promulgated in Commonwealth Gazette No. 22, of 1957.]

4/8045 Captain P. B. Opie is appointed from the Regular Army Special Reserve, Royal Australian Army Medical Corps (Medical), and to be Captain, 14th February, 1957, with a Short Service Commission for a period of two years. [In lieu of the notification respecting this officer which appeared in Executive Minute No. 25 of 1957, promulgated in Commonwealth Gazette No. 19 of 1957.]

Citizen Military Forces.

Northern Command.

Royal Australian Army Medical Corps (Medical).—1/39193 Captain (provisionally) B. T. O'Sullivan relinquishes the provisional rank of Captain, 6th August, 1957, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command) in the honorary rank of Captain, 7th August, 1957. 1/46809 Captain (provisionally) P. J. Milroy relinquishes the provisional rank of Captain, 7th August, 1957, is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command), and is granted the honorary rank of Captain, 8th August, 1957. The provisional appointment of 1/55673 Captain G. F. Dixon is terminated, 8th August, 1957. To be Temporary Majors, 17th September, 1957: Captains 1/67935 J. A. Nye and 1/39200 N. C. Davis. To be Captain (provisionally), 9th August, 1957: 1/55673 Grahame Frank Dixon. 1/10316 Major H. W. A. Forbes is appointed to command 2nd Casualty Clearing Station, and to be Temporary Lieutenant-Colonel, 1st October, 1957. 1/39147 Lieutenant-Colonel C. C. Wark, M.B.E., relinquishes command 2nd Casualty Clearing Station, 30th September, 1957, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command), 1st October, 1957.

Eastern Command.

Royal Australian Army Medical Corps (Medical).—2/146504 Colonel G. N. Young, E.D., is appointed from the Reserve of Officers, and is appointed Consultant Gynæcologist, Army Headquarters, 1st July, 1957. To be Temporary Major, 12th September, 1957: 2/127049 Captain G. R. W. McDonald. To be Temporary Major, 2nd October, 1957: 2/152043 Captain J. Laing.

Southern Command.

Royal Australian Army Medical Corps (Medical).—3/77537 Lieutenant-Colonel G. G. Harkness is appointed Deputy Director-General of Medical Services, Army Headquarters, and to be Colonel, 1st August, 1957. 3/101811 Colonel T. K. Durbridge relinquishes the appointment of Deputy Director-General of Medical Services, Army Headquarters, 31st July, 1957, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Southern Command), 1st August, 1957. The provisional rank of F3/1030 Captain A. K. Garven is confirmed. 3/101833 Captain F. W. Shine relinquishes the provisional rank of Captain, 31st August, 1957, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Southern Command), in the honorary rank of Captain, 1st September, 1957. The provisional appointment of 3/129011 Captain A. M. Marshall is terminated, 7th January, 1957. To be Colonel, 21st February, 1957: 3/101811 Lieutenant-Colonel (Temporary Colonel) T. K. Durbridge. To be Colonel, 25th June, 1957: 3/50196 Lieutenant-Colonel (Temporary Colonel) C. D. Donald, E.D. To be Captains (provisionally): 3/129011 Alan Morrison Marshall, 8th January, 1957, and 3/87648 Ian Christopher Goy, 23rd September, 1957. 3/101815 Major G. W. Cooper ceases to be seconded whilst in the United States of America, 18th July, 1957.

Central Command.

Royal Australian Army Medical Corps (Medical).—The probationary rank of 3/101020 Captain D. N. Hawkins is confirmed. The provisional appointments of the following officers are terminated: Captains 4/32073 J. S. T. Cox, 8th February, 1957, and 4/32074 A. J. Day, 30th April, 1957. To be Captains (provisionally): 4/32073 John Samuel Tweedale

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED NOVEMBER 16, 1957.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	..	..	6(5)	..	..	..	..	..	6
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	3	..	..	..	..	..	3
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	1	..	..	..	..	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	2	2(2)	..	..	1	..	5	..	10
Diphtheria	2(2)	..	..	..	..	..	..	..	2
Dysentery (Bacillary)	..	1(1)	..	..	4(2)	..	1	..	6
Encephalitis	3(1)	1(1)	1	..	..	..	..	..	5
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	1	..	..	..	1
Infective Hepatitis	65(23)	21(11)	4	4(2)	5(2)	3(2)	..	..	102
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	1	..	..	..	1
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	1	2(1)	..	..	..	..	..	..	3
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	..	..	..	..	..	..	..	..
Puerperal Fever	..	1(1)	1(1)	..	..	..	1	..	3
Rubella	..	77(54)	14(11)	45(20)	40(30)	..	1	1	178
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	5(3)	6(5)	1(1)	1(1)	2(1)	1	..	..	16
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	..	1	1
Trachoma	..	..	..	..	..	..	1	..	1
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	32(12)	9(3)	26(12)	2(2)	9(6)	4(1)	7	..	89
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Cox, 9th February, 1957, and 4/32074 Allan John Day, 1st May, 1957.

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps (Medical).

The following officers are placed upon the Retired List with permission to retain their rank and wear the prescribed uniform, 30th September, 1957:

Northern Command.—Lieutenant-Colonel L. G. Hill, O.B.E., and Captain T. L. Llewellyn.

Eastern Command.—Lieutenant-Colonel K. C. T. Rawle, E.D.

Southern Command.—Captain J. B. O'Collins.

The following officers are retired:

Northern Command.—Honorary Captain H. Masel, 30th September, 1957.

Eastern Command.—Honorary Captain W. W. H. King, 30th September, 1957.

Southern Command.—Honorary Captains M. Hoban and R. Nettleton, 31st August, 1957. [In lieu of the notification respecting these officers which appeared in Executive Minute No. 94 of 1957, promulgated in Commonwealth Gazette No. 50 of 1957.]

Central Command.—Honorary Captain C. T. Piper, 30th September, 1957.

Notice.

ST. VINCENT'S HOSPITAL, SYDNEY.

A SERIES of case presentations in psychosomatic medicine will be given at St. Vincent's Hospital, Sydney, for four weeks on Thursdays from 5 p.m. to 6 p.m., commencing on November 28, 1957. The presentations will be given by Dr. B. Haynes, in the out-patient department.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course in Advanced Medicine.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a course in advanced medicine suitable for candidates for the examination for membership of The Royal Australasian College of Physicians will be held for a period of eleven weeks from January 13 to March 28, 1958. The programme will take place in the afternoons from Monday to Friday and on Saturday mornings.

It is desirable that candidates should have had considerable experience in clinical work, in either hospital or medical practice, before considering themselves prepared to take examinations for higher medical degrees or diplomas. The course will be found of value to practitioners intending to devote further time to acquiring such experience before taking the examination, and also to those who are not seeking higher qualifications, but who are anxious to widen their knowledge of internal medicine. It is expected that students will devote considerable time to the reading of text-books and current medical literature.

The fee for attendance is £31 10s., payable in advance at enrolment date, and early application is desirable. Enrolment can be made for the whole or portion of the course. Applications should be sent to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, from whom further particulars may be obtained. Telephones: BU 4497-8. Telegraphic address: "Postgrad Sydney."

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

THE Melbourne Medical Post-Graduate Committee announces that the following programme has been arranged for Dr. Owen H. Wangensteen, Professor of Surgery, University of Minnesota: Tuesday, December 17: 5.15 p.m., clinico-pathological meeting at St. Vincent's Hospital. Wednesday, December 18: 10.15 a.m., university lecture to fourth year students; 8.15 p.m., lecture for the Post-Graduate Committee at the Medical Society Hall on "Intestinal Obstruction". Thursday, December 19: 1 p.m., open forum at the Royal Melbourne Hospital for one hour, Mr. J. Orme Smith, Dr. O. Wangensteen, Dr. W. G. D. Upjohn, Mr. R Officer, Mr. A. R. Kelly. Friday, December 20: 11 a.m., combined round, Alfred Hospital; 5.15 p.m., meeting at the Royal Australasian College of Surgeons, open to members of the medical profession, "Ætiology of Gall-Stones".

Deaths.

THE following deaths have been announced:

WHITE.—Weeks White, on November 19, 1957, at Leeton, New South Wales.

O'SULLIVAN.—John O'Sullivan, on November 24, 1957, at Canterbury, Victoria.

ANDERSON.—Phyllis Margery Anderson, on November 28, 1957, at Sydney.

Diary for the Month.

DEC. 9.—Victorian Branch, B.M.A.: Executive of Branch Council.
DEC. 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
DEC. 11.—Victorian Branch, B.M.A.: Branch Council.
DEC. 12.—New South Wales Branch, B.M.A.: Branch Meeting.
DEC. 13.—Tasmanian Branch, B.M.A.: Branch Council.
DEC. 13.—Queensland Branch, B.M.A.: Council Meeting.
DEC. 17.—New South Wales Branch, B.M.A.: Medical Politics and Ethics Committees.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales. Anti-Tuberculosis Association of New South Wales.

Queensland Branch (Honorary Secretary, 88 L'Estrange Terrace, Kelvin Grove, Brisbane, W.1): All applicants for Queensland State Government Insurance Office positions are advised to communicate with the Honorary Secretary of the Branch before accepting posts.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

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References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

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